UNIVERSIDADE TÉCNICA DE LISBOA
INSTITUTO SUPERIOR DE AGRONOMIA

Beef Quality Model: Portuguese Consumers' Perception

Marija Banović

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Tese apresentada neste Instituto para obtenção do grau de Doutor

Lisboa, 2009

Modelo de Qualidade para a Carne de Bovino: Percepção dos Consumidores Portugueses

Resumo

Neste trabalho investigou-se de que forma os consumidores portugueses percepcionam a qualidade da carne de bovino e quais são os principais factores que influenciam este processo. Foram introduzidas novas directrizes teóricas e metodológicas para este tipo de análise.

Abordou-se de forma integrada o processo de percepção da qualidade por parte do consumidor num ambiente real, quer no acto da compra, quer no momento do consumo, e as suas implicações nas decisões futuras de compra de carne de bovino.

A marca é um factor importante no processo de percepção da qualidade da carne, quer na avaliação de atributos intrínsecos, quer na qualidade esperada. O modo de produção influencia a qualidade experimentada da carne, sendo a produzida de acordo com métodos tradicionais a que é percepcionada como tendo melhor qualidade. Ficou demonstrado que esta percepção da qualidade por parte dos consumidores depende de anteriores experiências com o produto.

Estes resultados revelam no sector da carne de bovino potenciais caminhos para o desenvolvimento de produtos mais orientados para as preferências dos consumidores. Num contexto mais amplo, podem servir para sensibilizar os investigadores para a necessidade e interesse de estudos sobre o processo de percepção de qualidade por parte dos consumidores.

Palavras-chave: consumidores, percepção da qualidade, carne de bovino, marca, experiência de consumo

Abstract

The aim of this work was to investigate how consumers perceive product quality and what are the main factors that influence this process regarding beef in Portugal. With this goal in mind, new theoretical and methodological guidelines for the analysis were introduced.

An integrative approach to consumers' quality perception process has been applied, studying how Portuguese consumers perceive beef quality in a real-life purchase environment, at the point of purchase, as well as upon beef consumption, and it's implications for future purchase intention.

Branding has been found to be an important factor in consumers' perception of beef quality and is used both for inference of intrinsic cues and quality expectations. Animal production method has been found to influence consumers' quality experience of beef, where beef from traditionally raised animals is perceived as of better quality. These consumers' quality perceptions were found to be dependent upon the previous product-related experience.

The insights from this research show potential pathways for consumer-led product development in the beef sector. In a broader context, this thesis may serve to sensitize researchers for the need and interest of studies on consumers' product quality perception process.

Key-words: consumers, quality perception, beef, branding, product-related experience

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Acknowledgements

From the early childhood the saying of my late grandmother Dušanka: *Ko pita ne skita* or equivalently: *Better ask the way than go astray*, made me aware of the importance of questioning. I think it is only then, that one gets the big picture - whether it is in the right or the wrong direction.

When I set out to do this thesis, there were many people who gave me tremendous support and encouragement, and helped me get on with life in uneasy circumstances. In the first place, I would like to thank my supervisors Prof Raul Jorge, Prof Madalena Barreira and Prof Magda Aguiar Fontes for the enthusiasm and support they have given me. My special gratitude goes to Magda, to whom I would like to say: *Hvala najlepše za sve one ohrabrujuće reči*, or equivalently: *Muito obrigada por todas as palavras animadoras.* Prof Madalena, next lunch is on me. It has been a unique pleasure to work under the guidance of such wonderful supervisors. In addition, I wish to give special thanks to Prof Klaus Grunert for the enlightening discussions and numerous important pieces of advice, and who helped me understand the universe of consumers' perception.

I would also wish to thank *Fundação para a Ciência e a Tecnologia* (*FCT*), Programme AGRO through the Project 422 and *Centro de Investigação Interdisciplinar em Sanidade Animal* (*CIISA*) without whose support this research would have not been possible. In addition, special acknowledgement goes to school *Eça de Queiróz* and to all wonderful people with whom I made my first steps in Portuguese.

And there are other people from *Faculdade de Medicina Veterinária* (*FMV*) and *Instituto Superior de Agronomia* (*ISA*) I would like to thank, some of them my dear friends. A special mention goes to André and Sérgio for many delightful debates under the sunny Lisbon sky accompanied with tea and cookies. Thanks also to D^a Paula da Silva who advised me when I was out of my wits. Girls from room 3.79 keep smiling, and Maria João, my office mate, thank you for the wonderful company. Here, special thanks goes to the marvellous people from *Århus Business School - MAPP*, and especially to my mates Polymeros and Sladjana, as well as Robert, Pradeep, Christoph and my favourite *Bollywood star* Vikram.

Another special acknowledgement goes to all of you guys who made my life in Lisbon truly memorable, particularly you Silvia, Zrinka, Vanja, and my neighbours Nikola, Milan and family Djoković. Pascoal family thank you for the sincere care you have always given me.

And last but certainly not least, my deepest gratitude goes to my dearest Banović and Arsenijević clan, my *bros* Jurke and Saša, *guru* Šošon, choir mates, especially Marija, and all the family and friends from the country that no longer exists.

And there is *you*, who has always been there and without whom all this would not have been possible.

Part I

Introduction

This introductory part previews much of what this thesis is about, and gives an overview of the challenges of today's food market and the conceptual foundations of the consumer-oriented approach to food quality. The virtues and handicaps of implementing consumer-oriented approach to food quality are discussed. Having in mind some of these handicaps, objectives of the performed research are introduced. Finally, the organisation of this thesis is described.

Surfing websites or discussing products and brands can be a lot of fun - almost as much fun as actually making purchases! But, on the more serious side, why should managers, advertisers and other marketing professionals bother to learn about this field?
The answer is simple: understanding consumer behaviour is good business.

- Michael Solomon -

1

The challenges of the food market

There is no alternative to food. Food represents a system of existence, taking a central position in consumers' lives (Steenkamp, 1997). Nowadays, beyond this irrefutable fact of necessity, the way how consumers see food has changed (Grunert, 2002). Food became much more than a merely indispensable element, it has metamorphosed into a distinct aspect of consumers' lives.

The biggest influences of this change in consumers' preferences, tastes and attitudes with regard to food are socio-cultural, economical, scientific, and technological evolutions in developed countries (Meulenberg, 1997; Steenkamp, 1997). From one side global-scale food production and distribution, have brought diverse, every-increasing, and everywhere-all year available food supply. Hence, consumers have never had so much food choice. In the stores, it can be found a bucket of items from all over the world, as well as, for those who do not have time to prepare food for themselves, a whole pail of convenience food. This considerable diversity of foodstuff, from different countries, and its availability throughout the year, have made consumers choices ever more differentiated, complex, and dynamic (Davies, 2001; Grunert, 2003). On the other hand, increase in the disposable income, higher proportion of working women, increase in the literacy levels, smaller households, and ageing of population, resulted in the decline of the share for food in total household spending (Banović, Barreira & Aguiar Fontes, 2006a; Mihalopoulos & Demoussis, 2001).

This imbalance between supply and demand have increased the relative importance of consumer choice (Meulenberg & Viaene, 1998) and brought forward consumers as the central element in the discussion of the food markets (Grunert, 2002). Thus, food markets shifted 180° degrees from being product-driven to being consumer-driven (Dagevos & van Gaasbeek, 2000).

The fact that the food markets became buyers' markets rather than sellers' markets (Grunert *et al.*, 1996) raised many challenges on all those involved in the food chain. These challenges refer largely to consumers, where those involved in the food chain have been claiming that consumers' food choice have become very difficult to understand and predict (Grunert, 2003). This is mainly due to the significant transformation in the core and nature of consumers' food choice, generated by lifestyle changes observed in the last decades.

Nowadays, consumers' food choice makes a statement about *who one is* and about *the type of consumer with whom one wishes to identify*, or *maintain a distance* (Solomon, Bamossy & Askegaard, 2002). In this way, lifestyle refers not only to a consumption pattern reflecting consumers' choices of spending time and money, but also to their attitudes and values attached to these behavioural patterns.

Furthermore, smaller households, higher-educated families, working parents, amongst other alterations, have triggered a quiet revolution which is working its way in establishing consumption patterns. In addition to this is the growing consumers' awareness of the interdependence between food production, consumption, and their own health. The growing attitudes like: *I would pay more for organic beef* or *We should cut down the use of genetically modified organisms* (*GMO's*), and the importance of values like: *quality of life* and *well-being*, are exerting influence on the way how consumers perceive and evaluate foodstuff, thereby increasingly determining consumers' food choice (Meulenberg & Viaene, 1998). The complexity of the food production and issues, such as use of *GMO's*, *food irradiation*[1], *Bovine Spongiform Enchephalophaty* (*BSE*) and *Creutzfeldt-Jakob disease* (*CJD*), have increased consumers' demand for more and better information about the food they eat and how it is produced, as well as for a higher degree of control over these processes (Davies, 2001).

Consequently, the evolution of consumers' lifestyles and values, as well as abundant food supply, new technologies, scientific discoveries, complexity of the food production, information about food risks and its linkages with diet and health, and the mass communication of this knowledge, have had a strong impact on consumer behaviour and have made consumers highly fragmented, critical of, and demanding about, food quality and safety in developed countries (Meulenberg, 1997; Steenkamp & van Trijp, 1996). Thus, food consumers in developed countries have become far more complex to understand and predict (Grunert *et al.*, 1996). However, it is this complexity of consumers' demand that is amenable for analysis, and which can be turned into a real source of advantage (Grunert, 2003).

This has considerable implications for firms in the food chain. Thus, those firms who would be able to reveal, or even better, to foresee the consumers' demand, and deliver it would raise their chances of survival and success in the food market (Kohli & Jaworski, 1990). This is unquestionable in today's global food markets, where *chance advantage* should be immediately recognised and made full use of, seeing that those enrolled in the food chain pursue to produce and sell foodstuff to both known and unknown consumers *in the midst of the world-wide competition* (Grunert, 2005; van Trijp & Steenkamp, 1998).

1.1 The challenges of the meat and beef market

Meat has traditionally constituted a basic component of the Western-European dietary culture and has been related to the notion of rich, *proper* food, that contributes to strength, health, longevity, and the well being of man (Verbeke, 2000; Aumaître, 1999).

In the European Union (EU15), meat accounts for the higher proportion of households' food expenditure, representing around 28% of total food expenditure in Belgium, Spain, France, and

[1] *Food irradiation* is the process of exposing food to *ionising radiation* to destroy microorganisms, bacteria, viruses, or insects that might be present in the food. *Cold pasteurisation* is often used as a synonymous to *food irradiation*, however terms *pasteurisation* and *irradiation* are fundamentally different processes, and use of the term pasteurisation in this context is quite controversial.

Luxembourg, around 26% in Portugal, Austria, Italy, and Greece, and around 24% United Kingdom, Ireland, and the Netherlands (EUROSTAT, 2008). The meat from bovine animals participate with the highest share in the total meat expenditure in the majority of EU countries, while in Austria, Portugal, Sweden and Finland pig meat participates with the higher share (EUROSTAT, 2008).

Despite the fact that meat accounts for the higher proportion of households' food expenditure, the meat sector has been often shaken by the various crises and breakdowns in consumer confidence. These negative associations have been, and probably will continue to be, further strengthened due to the constant debate and fear around the use of *hormones* to promote animal growth, *BSE* disease, *Transmissible Spongiform Encephalopathy* (*TSE*) disease, *foot-and-mouth* disease, *dioxin* crisis, and other health-related crises linked to meat. As a result of these public concerns, meat is the only food group whose share has declined in food expenditure in most of EU countries, as well as in Portugal (EUROSTAT, 2008). The EU beef sector has been particularly shuddered by this sudden crisis. To be more specific, since the *BSE* incident became a matter of public interest, consumers' concerns accentuated even more when the British government admitted that there might be a relation between *BSE* and the appearance of *CJD* disease in humans. Consequently, food safety concerns have been shared among EU consumers, with substantial effect on the consumer behaviour and overall meat consumption (Krystallis & Arvanitoyannis, 2006; Banović *et al.*, 2004).

During the 1990s in many EU countries the annual *per capita* beef consumption has dropped from 22kg in 1990 to 18kg in 1996. The next *BSE* outbreak in 2000 resulted in another drop of the EU annual *per capita* beef consumption by 27%, with regard to the 1990 level (Roosen, Lusk & Fox, 2003; Banović *et al.*, 2004). In Portugal, while all meat groups[2] have increased their share in meat expenditure, beef has decreased its share from 32% in 1995 to 24% in 2000 (Banović, Barreira & Aguiar Fontes, 2006a). What adds to this is the decrease in the Portuguese annual *per capita* beef consumption by 4% in the period from 1990 to 2001, and the fact that this decrease was highest in 1996, when Portugal had a higher proportional decrease in beef consumption than the decrease that took place in the EU as a whole (Banović *et al.*, 2004). This decrease in both beef consumption and expenditure might be explained by the health and safety concerns raised by the *BSE* crisis, during which consumers lost their trust in the production systems and without a strong guarantee of beef safety, choose not to buy and consume beef (Barreira & Duarte, 1997; Barreira & Vicente, 2001; Barreira, Banović & Aguiar Fontes, 2005).

In order to prevent potentially *BSE*-infected tissues from entering the human food chain, recover beef consumption to past levels, and restore consumer confidence, the European countries have designed a variety of control measures, traceability systems, and increased vertical coordination to guarantee food safety along the supply chain (Angulo & Gil, 2007; Banović *et al.*, 2004). All this provided a solid base for protecting animals and consumers' health, having, as ultimate goal the restoration of consumers' confidence towards beef.

Repeating crisis in the meat sector have also created another consumers' quest, where they were seeking security in *national/regional/local heritage* and *traditions* (Wilson & Fearne, 1999). This also fortified the opportunity for a growing market of *value added* products that carry a strong identification with a particular geographical region (Loureiro & McCluskey, 2000), namely *Protected Denomination of Origin* (*PDO*), *Protected Geographical Indication* (*PGI*),

[2]Pig meat, sheep and goat meat, poultry meat, and other meat.

and *Traditional Specialities Guaranteed* (*TSG*). Through highlighting place of origin, foodstuffs became differentiated from generic competitive offerings, thereby enhancing their commercial appeal and competitiveness (Ritson & Kuznesof, 1996). Furthermore, more information about the way these products were produced were accessible to consumers. Consequently, these labels not only have provided more information and more choice possibilities of food products meeting consumers' demands for quality and safety, but also encouraged diverse agricultural production and rural development (Banović *et al.*, 2008). Moreover, quality labelling of meat, in comparison with traditional way of marketing meat, have allowed traceability within the chain.

All this was particularly useful for consumers in the environment where health authorities and the media continue to warn about the health risks of consuming certain food products, including meat. In this way *quality-seeking* consumers were able to select meat products with higher utility by being aware of their origin, nature, and production/processing methods. Thereby, by understanding consumers' perceptions that underpin renewed interest in traditional foods and using this information, those involved in the food chain will have an important commercial advantage to survive in the market, even when difficult situations occur, such as food scares.

The meat sector has also been confronted with another negative publicity, mainly due to the association of meat consumption with certain risks to human health. With diversity of meat products generally available on the market, meat has been identified as a food high in fat and cholesterol and exhibiting an undesirable balance of fatty acids (Wood & Enser, 1997). Despite the fact that some of the information reaching consumers is not always based on solid scientific evidence, there exists a widespread acceptance that higher levels of saturated fat consumption result in increased possibility of heart disease and certain types of cancer and diabetes. Consequently, restoration of the *meat image*, consumer reassurance, and addressing consumers' demands are becoming not only the factors of success, but ultimately factors of mere market survival.

Recent figures on Portuguese beef consumption show that the annual *per capita* consumption is still very slowly recovering to the levels before the first *BSE* crisis, where in 2007 *per capita* beef consumption was around 18 kg, and similar to the EU average (INE, 2008; EUROSTAT, 2008). Nevertheless, Portugal is not self-sufficient in beef production; in 2007 the self-sufficiency ratio was only 47%, with the EU being the major source of beef imports (INE, 2008). Within the EU, Spain, Netherlands, and France are the main suppliers, while Brazil[3] is the main one outside the EU. It seems that the embargo that has been imposed on Portuguese beef exports in 1998 after the appearance of *BSE* crisis, though lifted in 2004, left some marks on the beef sector. It should be pointed out that bovine meat suffered a decrease in production of 11% (in the period 1997-2007), and have reduced the weight of this sector in total Portuguese meat production in 2007 (INE, 2008). However, beef production with quality labels has increased in the last decade and accounted for approximately 3% of the total beef production in terms of slaughters approved for consumption in 2005 (Banović *et al.*, 2008). This joint features may be sign of a low market competitiveness in undifferentiated beef, but also some potential to increase market competitiveness concerning differentiated beef. Nevertheless, to be able to take advantage of this differentiation it is indispensable to understand consumers' attitudes, tastes

[3]Worth mentioning here, that at the beginning of 2008 EU has imposed embargo on the imports of Brazilian beef, which was lifted soon after.

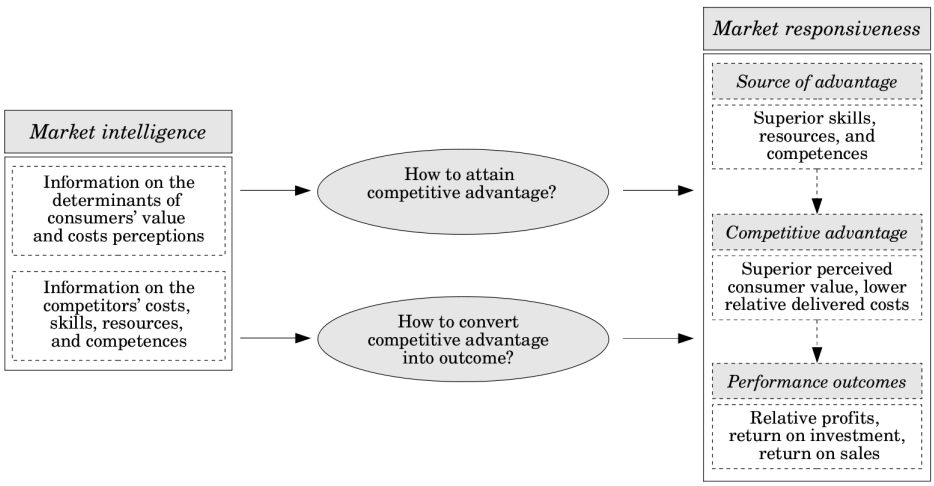
and preferences.

It appears that there is still a long and difficult way to go in order to prevent further contraction of the beef market. Thus, public and private efforts to meet consumer requirements must be based on detailed information about consumer meat preferences and quality perceptions. These new considerations regarding beef quality should be both those which would allow consumers to enjoy meat eating and those which would encourage some people to continue eating meat at all (Grunert, 2006).

Hence, there is a clear need for meat producers and distributors to obtain a deeper understanding of the meat market in which they operate and skilfully apply this knowledge in the creation of competitive advantage. One of the most adequate ways to achieve this is through implementation of a *consumer-orientation concept* (Grunert *et al.*, 1996).

Figure 1.1 shows how the understanding and usage of *consumers perceived wants* and generation of *market intelligence* and *responsiveness* is related to attainment of competitive advantage[4]. Consequently, as emphasised by many authors, the key to market-oriented quality improvement programmes in meat, and beef in particular, lies in the *translation* of consumers *quality wants* into those product parameters that will best *reflect* and *confirm* the desired *quality image* (Grunert, 2006; Steenkamp & van Trijp, 1996). This is obvious since consumers are the ones who decide *where*, *when*, and *what - to buy or not to buy* (Bech *et al.*, 2001).

Figure 1.1: *Market intelligence, market responsiveness, and competitive advantage: Grunert et al. (1996).*



Consumer behaviour towards beef has been a heavily researched subject for many years now, but today the attention paid to this field of research is even higher due to the indisputable and constant contractions of the beef market. Increased market demand for beef quality, and the occurrence of cross-national beef safety crises, as well as negative publicity associated to *red meats*, have raised even more the need for research on consumers' opinions. Hence, the current debate about challenges of the beef market clearly needs the consumer behavioural perspective, and change of the classical *farm-to-fork* to a *fork-to-farm* approach (Verbeke, 2005).

[4]Notice that besides knowledge on consumers' perception of product value or quality, it is important to be aware of the costs acquired by creating this quality as well as competitors' achievements, as these together may influence performance outcomes in various ways.

Quality...you know what it is, yet you don't know what it is. But that's self-contradictory. But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! There's nothing to talk about. But if you can't say what Quality is, how do you know what it is, or how do you know that it even exists? If no one knows what it is, then for the practical purposes it really does exist. What else would people pay fortunes for some things and throw other in the trash pile? Obviously some things are better than others...but what's the "betterness"?...So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is Quality? What is it?

- Robert M. Pirsig -

2

Consumer-oriented approach to food quality

Recently researchers became very interested in the concept of food quality from the consumers' point of view, as well as the factors underlining consumers' decision-making process. In order to understand these mechanisms an exhausting overview of the theories concerning consumer-oriented approach to food quality and quality perception process in particular is presented. First, a particular approach to quality, the consumer's perception process, and quality indicators are revised and analysed. Finally, theoretical approaches to consumer-oriented food quality are revised and discussed, as well as their virtues and handicaps, where special attention is given to the empirical studies concerning meat in general, and beef in particular.

2.1 Food quality

Food is not just a food (Grunert, 2003). When analysing food quality, it is of substantial importance to be aware of the differences between food and other products, especially because food products are non-durable products which change over time and have a limited shelf-life. Above all, food products have a very particular status in every individual's life, as they are a necessity, and are bought and consumed regularly. Thus, *we are what we eat*, and food plays an important role not only in traditional societies, but also nowadays. However, food quality is a quite diffuse concept with no lack of different definitions, views, and approaches. Many attempts have been made to crystallise and define the concept of food quality, but there is still no general agreement on what the term food quality covers, and how it can be measured, and this underlines its complexity (Brunsø, Fjord & Grunert, 2002).

However, even though quality concept is a knife-edge experience known to all and difficult to define, *we all know what it is* (Pirsig, 2007), and quality appears to be of paramount importance to all people. The universal recognition of quality by researchers and practitioners, as an indispensable component in general life and management, does not imply that it can be considered as an ambiguous concept (Oude Ophuis & van Trijp, 1995). Hence, it has been shown, that from the bulk of parameters, quality represents the most important one in creating

competitiveness (Bamberger, 1989), as well as that quality represents a core concept in building customers' value and satisfaction (Grunert *et al.*, 1996). Actually, quality became everyday *watchword* in the expanding of international competitive arena with the aim of planting consciousness of quality in all organisational processes of the company, and striving for continuous improvement through fulfilling consumers' *quality wants* as well as building consumers' confidence in the company's image (Hansen, 2001). Consequently, we are not lacking of different interpretations of the quality concept, Table 2.1.

Table 2.1: *Some general interpretations of the quality concept.*

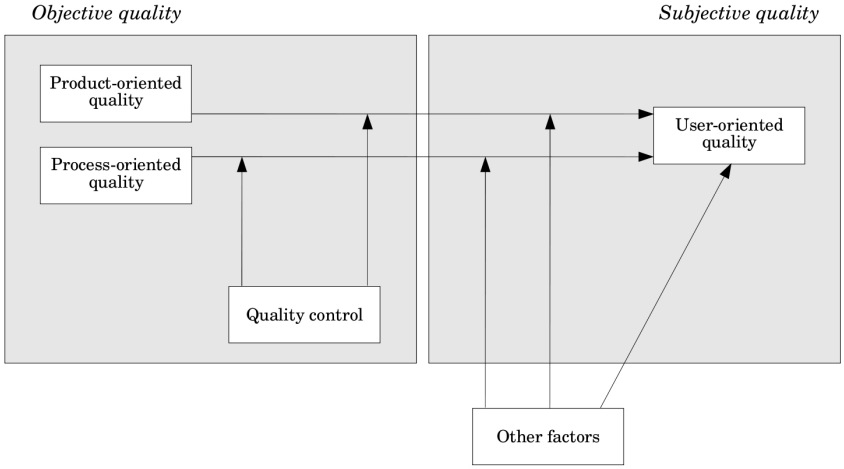
Approach	***Interpretation***	***Author***
Metaphysical	Quality is neither mind nor matter, but a third entity independent of the two, even though quality cannot be defined, you know what it is.	Pirsig (2007)
Product-based	Quality refers to the amount of the unpriced attributes contained in each unit of the priced attribute.	Leffler (1982)
User-based	Quality is fitness for use.	Juran (1989)
Manufacturer-based	Quality (means) conformance to requirements.	Crosby (1979)
Value-based	Quality is the degree of excellence at an acceptable price and the control of variability at an acceptable cost.	Broh (1982)
Generic	Quality is an objective reality unrelated to human existence, and a subjective reality that relates to thinking, feeling and discerning as the result of this objective reality.	Shewhart (1931)
Used nowadays	Quality is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.	ISO 8402

As seen from Table 2.1, definition of quality widely used nowdays contemplates an approach to quality as perceived by individuals, rather than quality *per se*. Actually, many authors agree that the field of food science has for a long time misdirected the search for the essence of food quality towards objective quality (see *Food Quality and Preference*, volume 6, 1995). The need for quality existed, and food quality was objectively measured for the nutritional, microbiological, or physiochemical characteristics (Cardello, 1995). Thus, the traditional definition of food quality was relaying on what the *experts say it is* (Lawless, 1995). The nutritional, microbiological and physiochemical characteristics of the food products as well as the experts' opinions were important to pre-establish standards of food quality, but these *qualities* were linked only to objective quality. Here, defects and deviation from the *ideal set* were identified in product, assuring consistency with experts' opinions. Yet, objective quality is just a part of the *universe of quality* and it cannot be the holder of the term quality (Lawless, 1995; Peri, 2005), due to:

- the lack of correspondence between experts and consumers opinion (i.e. what experts think good or bad often is not matching consumers opinion);
- the lack of applicability to new foods (i.e. takes a lot of time for consumer adjustment);
- the psychophysical measurement problem (i.e. giving an overall score based on the basis of the multidimensional changes in the product character); and
- the mixing of the test objectives (i.e. terms used to describe defects sometimes phenomenologically complex and difficult to master).

In the consumer research field four different notions of food quality are proposed, Figure 2.1. *Product*, *process-oriented quality*, and *quality control* comprise *objective food quality*, since they can be measured and documented. On the other hand, *user-oriented quality* comprises *subjective food quality*, as it is measured by *end-user* and can differ between the users of the same product. *Product-oriented quality* takes into account all the physical features of the product (e.g. fat content). *Process-oriented quality* involves the manner how the product was manufactured, and these features may not always influence the characteristics of the physical product (e.g. organic production). *Quality control* represents all the standards and regulations the product has to fulfil in order to be approved for the specific quality class (e.g. *ISO* 9000 standards). The *user-oriented quality* besides being influenced by the other three types of quality, can be also influenced by other factors (e.g. store type). For example, for a consumer, quality of the same product sold in a healthy shop may differ from the criteria for the same item, this time sold in a supermarket. Finally, the four types of food quality interrelate, but their interrelationships are *by no means clear and easy* (Steenkamp, 1990).

Figure 2.1: *Types of food quality: Brunsø, Fjord & Grunert (2002).*



Despite this fact, many of the food companies still place their discussion towards objective food quality, often without taking into account how will consumers react to the product changes, and whether will they perceive these changes at all. They are led by the reasoning that quality is an *expert's opinion* and therefore considered constant for a limited period. Nevertheless, specifications and standards may be meet, but the consumer final evaluation process encompasses all. Thus, consumers' opinion must be one *benchmark* for a good quality.

Therefore, it would be deceptive to think that the product that complies to *high objective standards is of high quality when it is disliked by the consumers, due to some characteristic or taste* (Cardello, 1995). Consumers are the ultimate arbiter of what's good and what's poor, as they cast a vote by what they purchase (Lawless, 1995). Hence, it is this *subjective quality perception* that is substantial and critical for creating competitive advantage, since the best marketing department in the world cannot sell products which fail to meet consumers' needs (Hauser & Klausing, 1988). The competitive situation of the product could then be improved only if the pre-established standards of objective quality would be changed in that matter to

reduce the costs either for the producer or consumer, and/or if this change would lead to a positive change in subjective, consumer-oriented quality, where the consumers would see the product as a higher value good (Grunert, 1995). Thus, if the consistency between objective and subjective food quality exists, that is, *if the combination of attributes or characteristics of a product have significance in determining the degree of acceptability of a product to a consumer* (Cardello, 1995), consumers and company will *meet* in the marketplace (Hansen, 2001). In other words, the company that is able to closely approximate a product to an adequate *index* of food quality, as perceived by a consumer, and communicate this effectively, will improve its chances for success in the marketplace.

However, one thing is certain, the concept of food quality is embracing both *objective* and *subjective* food quality contemplated as a totality (Oude Ophuis & van Trijp, 1995). Therefore, to deny utility of consumer-based approach to food quality is like to deny validity of psychophysical methods, and this does not reduce the food quality to a level of complete subjectivity, on the contrary, it is here where the essential element of food quality lies.

Hence, and as underlined by many authors, it is not sufficient to state that the product is of high quality, but quality must be supported by a specific concrete benefit for the consumer, which consumers regard as important and are able to infer when buying the product (Issanchou, 1996; Cardello, 1995). Thereby, food quality is closely allied with the concept of consumer acceptability and *perceived quality*, which is the approach that will be used in this research.

2.1.1 Meat and beef quality

Consumers' perceptions of the quality concept in the meat sector in general, and in the beef subsector in particular, have become even more important for all those involved in the meat-chain due to the repeated events of scares and negative publicities related to meat (see Section 1.1). In the midst of these turbulences in the meat sector it is the consumers' subjective perception of quality that is decisive and critical for meat purchases, and thus meat suppliers must be involved in the greatest challenge of all, and be able to understand the consumers' quality wants. Thus, the greatest dare of today's meat market in general, and beef market in particular, lays exactly in uncovering *qualities* consumers use, as well as the *perception process* through which these *qualities* are integrated in consumers' decision-making. In that way, identification of these important *qualities* from the consumers' viewpoint, and their communication is likely to lead to more vivid and predictable consumer behaviour.

Yet, which meat *qualities* matter for consumers? There are different approaches and views on which *qualities* are being considered, their predictive power, and how are they being integrated in the consumers' decision making process regarding meat. Some authors claim that meat quality demanded by consumers is more product and process-specific, where consumers base their quality evaluations more on colour or fat of the meat (Davidson, Schroder & Bower, 2003; Brunsø *et al.*, 2005). Others argue that product information, such as origin and labelling, are being increasingly considered by consumers helping them to make inferences in relation to the meat quality (Bernués, Olaizola & Corcoran, 2003a,b).

To make things more complicated, different *qualities* are used and meat product perceived differently if bought at the supermarket or at the butcher shop (Grunert, 1997). Moreover, the meat product is perceived differently depending on its intended usage (e.g. culinary and consumption context). For example, choosing the correct cut of beef is very important when

grilling. Some of the best steaks for grilling are the premium cuts (i.e. *loin*, *strip loin* muscle), where again their thickness is very important. Furthermore, and dependent on the consumer, beef steaks that have red or bloody colour, when prepared, may be perceived as tasty and juicy (i.e. of a good quality) by some, while opposed by others (Savell *et al.*, 1989). In addition, and as shown, fresh beef steaks may differ in their objective quality (i.e. fat content, flavour, and tenderness), due to the breed type and production system (Realini *et al.*, 2004). Following, one cannot assume that consumers are not capable to recognise these differences, not only in the purchase phase, but also in the consumption phase. Thus, meat quality depends both on the consumer's perception and on the product, as well as on the context involved (e.g. pre-purchase, purchase, repurchase, consumption).

In the case of beef, as in all food products in general, sensory characteristics are very important, as they can only be evaluated after the purchase and ingestion of the product. On the other hand, *qualities*, as safety or healthiness, can not be ascertained even after consumption. Consequently, consumers' perceived product quality before purchase often differs from the product quality perceived after consumption (Grunert, Bredahl & Brunsø, 2004). What adds to this is the fact that fresh meat is mainly sold unbranded making consumers job of evaluating a piece of meat even more difficult, as consumers cannot be sure of the quality they are purchasing or even repurchasing (Latvala & Kola, 2002; Grunert, Bredahl & Brunsø, 2004). Here, adding a brand or a quality label might make a difference. However, one should be aware that consumers' individual differences also play an important role in the consumers' perceptions of meat (or beef) quality. More specifically, the amount and kind of experience with the product may influence the use of available information, with different consequences on the perceived beef quality. Having in mind the great biological variation in beef, and differences between pieces of meat from the same carcass, all this additionally complicates consumers' perceptions of beef quality, making it more intricate and amenable for analysis.

All this does not suggest that it is impossible to understand and analyse consumers' perceptions of beef quality. But in fact it does suggest that quality should be defined for a particular beef product and not for the whole product category (i.e. all fresh beef products), as definition of quality may vary depending on the types of products and the culinary context being considered. Further, another point in defining quality for a given beef product, should be to find a target population that buys and uses this type of product. This is of outmost importance since the knowledge of consumer characteristics (e.g. demographics and psychographics), among other things, is playing an important role in consumers' decision process (Solomon, Bamossy & Askegaard, 2002). Besides, all important contexts, as place, and situational factors, in which a target population buys and uses this type of product should be taken into account (Issanchou, 1996). Finally, one should find the *main qualities* that describe product's quality, and the information consumers use as *means* to obtain these *end* product *qualities*.

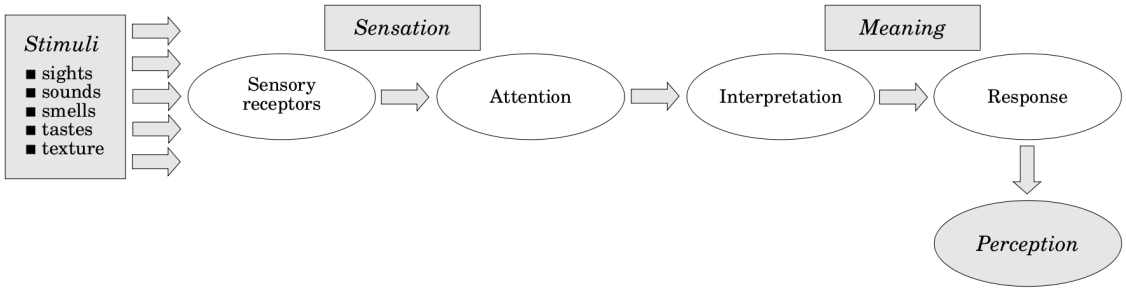
Hence, the collection of appropriate information concerning consumers' perceptions with regard to beef and translation of these by specific requirements and standards in a product, may help beef suppliers to more firmly face the repeated challenges in the beef sector and take a drive towards both efficiency and competitiveness. In order to achieve this one must first understand the consumers' perception process.

2.2 Consumer's perception process

In order to comprehend how consumers utilise and interpret the product information (and surrounding environment), as well as how the *quality meanings* are created, organised, and used to make sense of the product, it is of outmost importance to focus on the *perception process* (Solomon, Bamossy & Askegaard, 2002). Here, the focus is shifted from the more objective reality of available and perceivable information to more subjective processes of interpreting and understanding whatever sensation appears relevant for the consumer.

In the shop, consumers notice very small amounts of product information and, of these, an even smaller amount is attended to (Steenkamp & van Trijp, 1996). Further, information that does enter the consumer's cognitive structures is processed very actively and not at all objectively. Thus, it is interpreted by consumer's individual needs (e.g. purchase motives), experiences (e.g. previous purchases), as well as consumer's personal (e.g. attitudes) or social schemes (e.g. level of income). These stages of exposure (or sensation), attention, and interpretation comprise the process of perception, Figure 2.2. Thereby, perception is the process by which stimuli, such as sights, smell, and sounds, are selected, organised, and interpreted.

Figure 2.2: *Consumer's perception process: Solomon, Bamossy & Askegaard (2002).*



The selection of product information depends on the amount of exposure to this information, how much attention it generates, and how it is interpreted. The amount of attention decreases with the consumer's familiarity with the product information (Johnson & Russo, 1984). In other words, with higher familiarity with the product information, consumer's perceptions become more *automatic* and require less attention (Anderson, 1990). For example, if consumers buy the same type of product for years, they have been exposed more to it's information, the perception process has been practiced, and thus, requires less attention.

The product information that is selected by the consumer is classified and organised according to the *principles of perceptual organisation*[1] (i.e. *Gestalt principles*[2]). The main assumption of these *principles* is that product information is not perceived in isolation, but according to the overall pattern. For example, when consumers view the image in Figure 2.3 they will seek

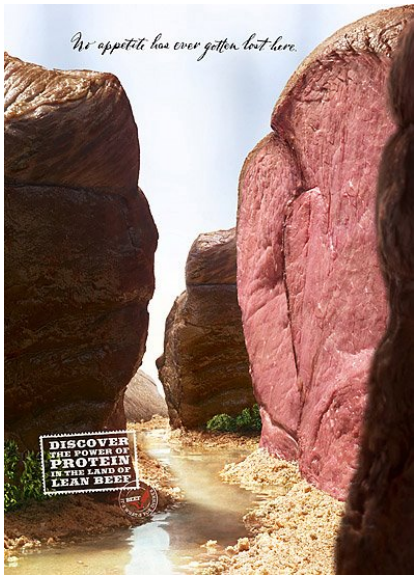
[1]Principles of perceptual organisation are brifely mentioned here, as they are beyond the scope of this research.

[2]Main Gestalt principles are: *principle of proximity* (i.e. consumers tend to perceive and organise elements close together into units); *principle of similarity* (i.e. consumers tend to group together elements that look alike); *principle of continuation* (i.e. continuation occurs when the consumer's eye is compelled to move through one element and continue to another), *principle of closure* (i.e. consumers tend to perceive an incomplete picture as complete); *figure-ground principle* (i.e. consumers tend to perceive part of information as dominating over another receding in the background), and *Law of Prägnanz* (i.e. when confronted with visual information, consumers will attempt to organise that information into the simplest form possible) (Anderson, 1990).

to interpret it in the simplest, most orderly, and symmetric form possible, thus they will perceive mountains, nature in general, even though this image is nothing more than grilled pieces of beef. Hence, this image invites consumers to recognise well-known shapes of beef steak dominating the background. Moreover, it uses associations, as natural, fresh, and lean to elicit positive product quality meanings. This interpretation is the decisive factor in the perception process, when consumers link available information to the higher order *meanings* or *qualities*.

How available information will be interpreted again depends on *accessibility* and *diagnosticity* of this information in the consumer's memory (Dick, Chakravarti & Biehal, 1990). That is to say, depending on how available information is in the consumer's memory and how predictable consumer thinks this stored information is, will decide the perception process. This is particularly true for food products, and especially fresh meat products, since they are rarely described completely, so *consumers often form inferences that go beyond the information given* (Kardes, Posavac & Cronley, 2004). However, it is not always possible for the consumer to do so, especially for novice consumers, who do not have the *necessary equipment* to read, understand, and accept available information in a way that is effective for later consumption experience. For example, as fresh meat products are often sold without complete information, this makes considerable difficulties for consumers to build up sufficient knowledge about the product that can be decisive and not disappointing (Brunsø *et al.*, 2005). Further, availability of the product substitutes within the given context (e.g. supermarket), as well as opinions of the relevant others (e.g. butcher's opinions) can also influence the consumers' perception process.

Figure 2.3: *An illustration of principles of perceptual organisation*[3].



Based on what has been said so far, consumers may be involved in two basic perception processes (Kardes, Posavac & Cronley, 2004), that is, *induction* or generalising from specific information to general conclusions, and *deduction* or constructing specific conclusions from general assumptions to specific behaviour. That is to say, consumers may use specific product information (e.g. organic production → healthiness) and general beliefs (e.g. domestic origin → safety) to infer product quality or higher order meanings. The information used as a basis for the perception process can be *stimulus based* or *memory based*. *Stimulus based* inferences are formed on-line in the shop using available information (e.g. colour of the meat), while *memory based* inferences are formed by using prior experience with the product (e.g. previous purchase experience). Thus, consumers may be involved in *bottom-up* processing - using only available information to infer product quality (e.g. unexperienced consumers) or in *top-down* processing - using both available information and previous product experience (e.g. experienced consumers)(Anderson, 1990; Rao & Monroe, 1988). Moreover, the available product information can be judged in relation to a single product, i.e. *singular context*, or to multiple products considered in relation to one another, i.e. *multiple context*. For example, quality of the branded product can be perceived in solitude (if other branded product is unavailable) or it can be

[3] `http://www.beefitswhatsfordinner.com/printads.aspx`

perceived and affected by the competitive context of other brands (when a large number of branded products is available) (Steenkamp, 1990). Hence, consumer may interpret and form different types of inferences, that is, *induction vs. deduction* × *stimulus-based vs. memory-based* × *singular vs. comparative* inferences (Kardes, Posavac & Cronley, 2004).

Table 2.2 depicts some of the examples of the eight types of inferences[4] that exist in the consumer behaviour literature. Most of the approaches and models with regard to the perception process proposed in the consumer behaviour literature, are underlined by some of the theories from Table 2.2, which will be explained in more detail in Section 2.3.

Table 2.2: *Consumer's perception processes, bases and judgement context: Kardes, Posavac & Cronley (2004).*

Stimulus-based		***Memory-based***	
Singular judgement	***Comparative judgement***	***Singular judgement***	***Comparative judgement***
Induction			
Information-integration theory	Assimilation & contrast	Correlation-based inference	Correlation-based inference in choice
Cue interaction effects		Heuristic-based inference	Inferential correction
Aggregation			Category-based induction
Deduction			
Syllogistic inference	Transitive inference	Attitude-based inference	Category-based deduction
		Reconstructive inference	Schema-based deduction

Thus, *why is the understanding of consumer's perception process important?* By comprehending the consumer's perception process algorithm, then a rendering algorithm could be developed targeting the information used in this process to evoke certain consumer's inferences or elicit certain *meanings* (e.g. PDO beef → tasty beef), in order to improve or obtain better chances for the product's success in the marketplace.

2.2.1 Quality indicators

When discussing the consumer's perception process of food quality, the crucial ingredients are for sure *quality indicators*. In consumer research, *quality indicators* are often interchangeably called *quality attributes*, *quality aspects*, *quality dimensions*, and *quality cues*, sometimes without making a difference between these concepts (Bernués, Olaizola & Corcoran, 2003a,b; Caswell, Bredahl & Hooker, 1998). However, the clear distinction has been made between *quality aspects* and *quality cues*, where as synonymous to *quality aspects*, *quality attributes* and *quality dimensions* have also been used (Bech *et al.*, 2001). The present research follows this distinction.

[4]It has been argued that: *inductive, stimulus-based, singular inferences* represent the overall evaluations of the product formed on the basis of specific attributes that are considered separately and integrated algebraically; *inductive, stimulus-based, comparative inferences* are shifts in judgement toward (assimilation) or away from (contrast) a reference point or standard; *inductive, memory-based, singular inferences* involve the use of specific cues to draw general conclusions about product benefits; *inductive, memory-based, comparative inferences* involve the comparison of brands that are not directly comparable because they are described by different types or amounts of information; *deductive, stimulus-based, singular inferences* involve making of of specific conclusions based on general arguments (i.e. A has X, if X then Y, therefore A has Y); *deductive, stimulus-based, comparative inferences* involve making of specific conclusions implied by the linear ordering of the overall evaluations of multiple brands; *deductive, memory-based, singular inferences* are inferences about specific attributes drawn from overall evaluations, and that *deductive, memory-based singular inferences* are evaluations of specific brands based on general categorical knowledge (Kardes, Posavac & Cronley, 2004).

Quality aspects

Most of the early research in the consumer area has been focusing on different *product attributes* as aspects of quality. These *quality aspects* were seen as concrete product characteristics as perceived and experienced by the consumers and further categorised in *search*, *experience*, and *credence quality aspects* (Stigler, 1961; Nelson, 1970, 1974; Darby & Karni, 1973; Wilde, 1980; Andersen, 1994). *Search quality aspects* are those product attributes which can be ascertained before the product purchase (e.g. colour, price). On the other hand, *experience quality aspects* are those which can be detected only upon the actual product consumption (e.g. taste). Finally, *credence quality aspects* represent those product attributes which cannot be learnt or detected either before or after the product consumption[5]. The categorisation of *quality aspects* into *search*, *experience*, and *credence* was supported in the consumer research (Becker, 2000), and it was pointed out that how certain product will be characterised (in terms of quality) depends on the consumer's perception of these *qualities* (Grunert, 1997). Likewise, it was indicated that in every day life *search quality aspects* are transforming into *credence* and further on to *experience quality aspects* (Andersen, 1994).

Another approach to the characterisation of product attributes (in terms of *quality aspects* they possess) was proposed in the research, where distinction has been made between *process* (e.g. traceability, feed, animal welfare), and *product quality aspects* (Northen, 2000). *Process quality aspects* were viewed as those *qualities* coming from the part of the production process (e.g. organic production), while *product quality aspects* were decomposed into sub-sets of *qualities*, including food safety (e.g. residues), nutrition (e.g. calories), sensory (e.g. taste), functional (e.g. convenience) and image attributes (e.g. snob value). *Product quality aspects* were further related to *process quality aspects* (such as sensory and nutrition attributes), which in turn might/or not affect *product quality aspects* (e.g. consumers will not detect any possible changes in the product accruing from improved animal welfare).

Nevertheless, this characterisation of product *qualities* follows greatly the previously mentioned distinction among *search*, *experience*, and *credence quality aspects*. Obviously, most of the *process qualities* and some *product qualities* (e.g. food safety) are mainly *credence quality aspects*, as they cannot be detected even after product consumption. On the other hand, some *product qualities* are *experience quality aspects* (i.e. sensory), while others can be viewed as *search quality aspects* (i.e. functional & image). In the consumer research, the three-type categorisation of product attributes on *search*, *experience*, and *credence qualities* has been widely used and found as very useful (Ford, Smith & Swasy, 1990; Wright & Lynch, 1995).

Quality cues

The categorisation of product *quality aspects* was deepen by another approach (Olson & Jacoby, 1972). In this approach it was assumed that, as quality is a complex concept (based on the several dimensions which cannot be all evaluated and perceived by the consumer), consumers use surrogate or indirect indicators of product quality (from abundance of product-related attributes) when forming product quality judgement, called *quality cues*. Further on, *quality cues* were distinguished between *intrinsic* and *extrinsic quality cues*. Where, *intrinsic cues* represent product itself (e.g. colour, smell), that is, those cues which cannot be changed or experimentally

[5]Notice that according to Bech *et al.* (2001) these are called *search*, *experience*, and *credence quality dimensions*.

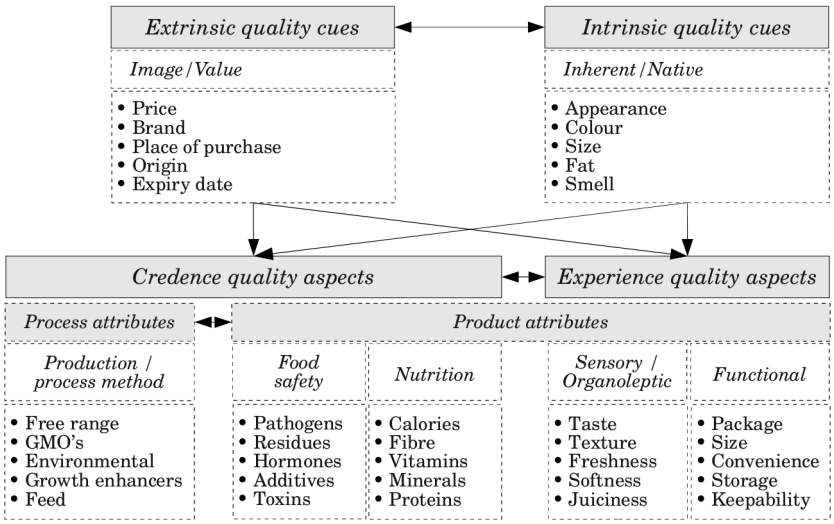
manipulated without also changing the physical characteristics of the product itself. *Extrinsic quality cues* take form of information about the product (e.g. brand, label information) and they can be manipulated without the need to change the physical product. Thus, *intrinsic cues* are part of the product, whereas *extrinsic cues* are related to the product but are not part of it. Thereby, *quality cues* can be defined as the pieces of information used by consumers to form quality expectations about a particular product (Steenkamp, 1990). In other words, *quality cues* represent the necessary communications or *stimuli* to consumers (at the place of purchase) needed to develop the product quality perceptions. In that way, at the purchase point consumers form an overall quality opinion about a particular product by the process of choosing *intrinsic* and *extrinsic quality cues* and combining their separate evaluations. This approach is well supported in consumer research (Steenkamp, 1989; Grunert *et al.*, 1996).

Finally, it was pointed out that *quality cues*, as they represent concrete product characteristics and can be ascertained by the senses prior to consumption, correspond to *search quality aspects* (Northen, 2000). Thus, it is clear that *search quality aspects* can be then substituted by the term *quality cues*. Moreover, *quality aspects* were further distinguished from *quality cues*, where quality aspects were seen as benefit-generating product aspects which cannot be sensed prior to consumption, but only as a consequence of consumption or usage of a product (Steenkamp, 1989). Furthermore, it was pointed out that *experience quality aspects* can be ascertained by the senses upon product consumption or usage, while *credence quality aspects* cannot be ascertained even then. However, *experience* and *credence quality aspects* can be inferred from *quality cues* and *expected* at the point of purchase, and afterwards confirmed or disconfirmed upon product consumption or usage (Anderson, 1973), where this relation determines final satisfaction with the product and probability of repeated purchase (Oliver, 1980).

Relationship between quality cues and quality aspects

Considering recently adopted view where consumers' infer product quality using *quality cues* (Grunert *et al.*, 1996; Steenkamp, 1989); relationship between *quality aspects* and *quality cues* can be observed, Figure 2.4.

Figure 2.4: *Quality aspects and quality cues.*



Hence, there is a steady stream of discussion about the relation of *quality cues* with *quality aspects*. Major topic is that *quality cues* play an important role in predicting *quality aspects*, as consumers use *quality cues* to form *expectations* of the desired *experience* and *credence qualities* when buying a particular product. It has been pointed out that *extrinsic cues* have more capacity (than *intrinsic cues*) to communicate successfully both *experience* and *credence quality aspects*, as they provide information prior to purchase (Northen, 2000). Moreover, as *extrinsic cues* are simpler to access, they can facilitate the quality evaluation of *credence qualities*, where consumers have difficulties when evaluating the product. Yet, the importance of *intrinsic cues* on the evaluation of *experience* and *credence qualities* was shown by several studies (see Grunert, Bredahl & Brunsø, 2004). This importance of *intrinsic cues* depends on whether they can be sensed and evaluated at the purchase point, in their absence consumers depend on *extrinsic cues*. Thus, *extrinsic cues* are usually used as *quality indicators* when the consumer is operating without adequate information about *intrinsic cues*. This situation may occur when the consumer has little or no experience with the product, has insufficient time or interest to evaluate the *intrinsic cues*, and cannot readily evaluate the *intrinsic cues* (Zeithaml, 1988).

The relative importance of *intrinsic* and *extrinsic cues* on the evaluation of different *qualities* is product dependent (Lappalainen, Kearney & Gibney, 1998). This is especially the case for unbranded and unlabelled products, such as fresh meat and other fresh foods, where quality evaluation has to rely particularly on *intrinsic cues*, such as appearance (Becker, 2000). Here, consumers' use of *cues* to infer *quality aspects* is sometimes rather surprising. Consumers use colour of meat to infer tenderness and packaging of beverages to infer healthiness (Grunert, 2002). In most of these cases, consumers are quite aware of the fact that the *cues* used are not highly predictive of the desired *qualities*, but they just go ahead and use them. The consumer's selection and utilisation of cues to infer different product *qualities* are at least partly guided by the consumer's familiarity with a particular cue (Johnson & Russo, 1984).

A non-exhaustive list of *intrinsic* and *extrinsic cues*, as well as *experience* and *credence quality aspects* and the relationship between them is presented in Figure 2.4. Most of the presented *quality cues* and *quality aspects* have been reported (Northen, 2000; Caswell, Bredahl & Hooker, 1998) or investigated in various food quality studies (e.g. Grunert, 1997; Steenkamp & van Trijp, 1996). As seen from Figure 2.4, *quality cues* and *quality aspects* are very much interrelated. For example, it is recognised the relevance of *intrinsic cues* for foods (and particularly fresh foods) such as appearance of fruits and vegetables, colour and fat of the meat, smell of a fish, as indicators of the *experience* and *credence quality aspects*, such as, taste, tenderness, and freshness, among others. Thus, different *intrinsic cues* may serve as *quality indicators* (depending on the food in question) of different *experience* and *credence quality aspects*. *Extrinsic cues*, such as price and brand, are recognised as very important indicators (since they can be manipulated without changing the physical product characteristics) of *experience* and *credence quality aspects* (Bredahl, 2003). Furthermore, there exists a significant interrelation between *experience* and *credence quality aspects*, as it was found that healthiness of a meat can be drawn from its taste and/or tenderness, among other things (Brunsø *et al.*, 2005).

However, it should be pointed out that *quality cues* and *quality aspects* can be identified at different levels of abstraction, depending on various factors, such as type of the product and/or shop. Thereby, assignment of *quality aspects* and *quality cues* to a particular category and their interrelation is not always conclusive.

2.3 Theoretical approaches to consumer-oriented food quality

In spite of the research that has been done so far, there is no singular commonly accepted theoretical model of consumer-oriented food quality. However, quite a mass of these models, which vary both in complexity and orientation, have been developed in social and economic sciences. Their focus is on describing and predicting how consumers' perceive food quality, so that a fuller understanding of different perception processes, both present and prospective, is achieved. The main assumption in these models is that the consumer perceive food quality by incorporating and fusing a number of characteristics of a product in an overall quality evaluation.

Hence, within the phenomenon of consumer-oriented food quality, several broad approaches to study the consumer quality perception process can be distinguished. These approaches mainly include the *economics of information theory*, the *multi-attribute theory*, the *hierarchical theory*, and the *integrative theory* (Grunert *et al.*, 1996). In this Section 2.3, a review of the most widely used theoretical models for explaining and predicting consumers' quality perception process will be presented. Special emphasis will be given to the application of those models to the problem in analysis - food, and particularly, beef.

2.3.1 Economics of information theory

The *economics of information theory* started with the quest on optimal amount of information that the consumer needs to gather before going shopping (Stigler, 1961). The source of this optimal amount of search information was based on the goods, yet quality was constant, and price was the only information to search about. Thus, consumers would weight their cost of additional search against the benefits they expect from that search. Benefits, in turn, were dependent on the dispersion of prices established by sellers.

This limited theory was afterwards extended by another approach, where quality was allowed to vary, making a major distinction between *search* and *experience goods* (Nelson, 1970, 1974). *Search goods* represent commodities whose quality can be evaluated before the purchase by simple inspection (e.g. shoes, clothes). On the other hand, *experience goods* represent commodities whose quality can be evaluated only after the purchase (e.g. eggs, meat). These information can further be an input to the decision-making about repeated purchases. Moreover, it was assumed that consumers are less sceptical of *search* than *experience goods* (Nelson, 1970, 1974), what was confirmed by empirical evidence (Smith, 1990; Wright & Lynch, 1995).

The *information theory* was furthermore extended by another distinction of the third type of *goods* defined as *credence goods* (Darby & Karni, 1973). The *credence goods* although worthwhile, cannot be evaluated in normal use, because they are expensive to judge even after purchase, and which at best can be picked up by chance or trough costly procedures. In addition, it was assumed that consumers are less sceptical of *experience* than *credence goods*. Nevertheless, later on it was shown that the consumer can be sceptical of both *credence* and *experience goods* (Ford, Smith & Swasy, 1990). Finally, Andersen (1994) and Wilde (1980) suggested that each product actually possesses *search*, *experience*, and *credence* characteristics or attributes and pointed out their differences (Subsection 2.2.1).

Virtues of the economics of the information theory

The *economics of information theory* contributed greatly to consumer-oriented food quality theory by answering revolutionary questions, as *what do consumers actually search about*; and after all, *why are consumers involved in this search in the first place?* Thus, information theory made a great *break through* by explaining the type of information consumers actually search about, and by emphasising that the type of information consumers choose to acquire is determined by weighting of the expected benefits in relation to the cost of their search. This opened the *new fronts* and raised the discussion on how actually consumers link various types of information.

Handicaps of the economics of the information theory

However, the *economics of information theory* was heavily criticised. The major criticism was that information theory does not provide a comprehensive model, which would explain how the consumers actually perceive product information (i.e. *search*, *experience*, and *credence* attributes) and how they integrate these beliefs in an overall quality evaluation (Grunert, 1997).

2.3.2 Multi-attribute attitude theory

Multi-attribute attitude theory is quite popular in the consumer research and it represents the psychological *modus operandi*, used to clarify and predict the consumer behaviour towards certain products (Solomon, Bamossy & Askegaard, 2002). The basis of this theory defines three elements: *attributes*, *beliefs*, and *importance weights*[6] (Ajzen, 1991). The main assumption here is that the consumer's attitude (overall evaluation) of an attitude object (e.g. product) will depend on the beliefs[7], that the consumer has about several or many attributes of that object, where some attributes are considered more important than others. By identifying these specific beliefs that consumer hold in mind, and combining them, the researcher can infer a measure of the consumer's overall attitude towards an object.

Therefore, if directing attention to the quality perception process, the overall quality of the product here is *multidimensional* and described by a set of attributes as perceived by the consumer. Consumer forms an overall evaluation of a product quality by weighting perceived attributes, in a way that attributes (believed by the consumer that the product possess) are weighted with the level of subjective importance of each attribute (Grunert *et al.*, 1996).

Although several different *multi-attribute attitude models* have been proposed in the consumer behaviour literature, one of the widely used nowadays is the *theory of planned behaviour* (*TPB*) model (Ajzen, 1991), which evolved from *Fishbein attitude model* (i.e. expectancy-value model of attitudes) (Fishbein & Ajzen, 1975), and *theory of reasoned action* (*TRA*) model (Ajzen & Fishbein, 1980).

The *Fishbein attitude model* states that attitudes develop reasonably from beliefs people hold about the object of attitude. However, only a few of beliefs actually influence attitude, called *salient beliefs*. An attitude, then, is a person's *salient belief* about whether the outcome

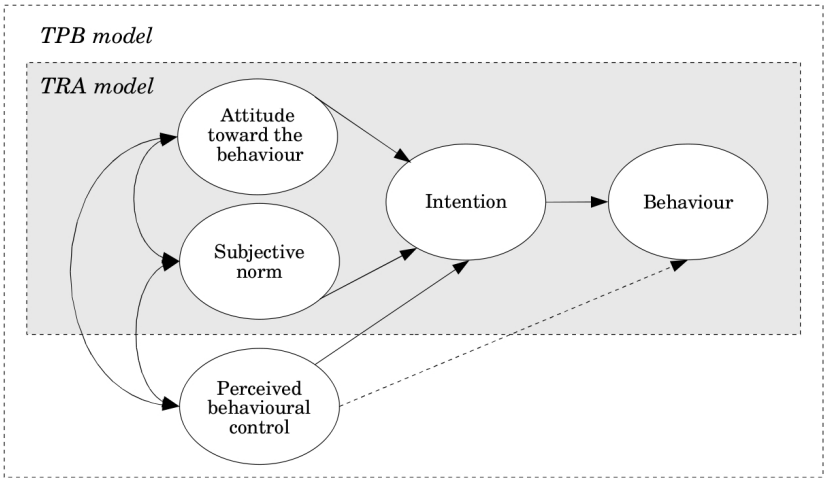
[6] *Attributes* represent the characteristics of the product that can be identified by the consumer and which consumers take into consideration when evaluating it. *Beliefs* are perceptions of the consumer that the specific product possesses a particular attribute (to some extent). *Importance weights* reflect the relative priority of an attribute to the consumer, where some attributes are more important than others.

[7] These beliefs may be formed from direct experience, or from outside information, or they are simply inferred (self generated).

of his action will be positive or negative. If the person has *positive salient beliefs* about the outcome of his behaviour then he is said to have a *positive attitude* about the behaviour, and *vice versa*. The beliefs are rated for the probability that engaging in the behaviour will produce the believed outcome, and this is termed the *belief strength*. Thus, the overall attitude towards an object represents the sum of products of the evaluated values of attributes and the strength of belief that such attributes are in the object. The same principle is used to study both attitudes towards an object and attitudes towards behaviour.

The fact that the general attitudes tend to be poor predictors of behaviour led to extension of the *Fishbein model* into the *theory of reasoned action* (*TRA*) model (Ajzen & Fishbein, 1980), Figure 2.5. *TRA* model involved besides person's *attitudes* towards the object or outcome also opinions of the person's social environment, called *subjective norm*, and observed *behavioural intentions* rather than *attitudes* as the main predictors of *behaviours*.

Figure 2.5: *Theory of reasoned action and theory of planned behaviour models: Ajzen (1991).*



As *TRA* model did not include unconsciously behaviour, irrational decisions, and habitual actions, but only behaviour under voluntary control[8], it was extended into the *TPB* model (Ajzen, 1991), Figure 2.5.

In addition to *TRA* model, *TPB* model included another construct, called *perceived behaviour control*[9], to obtain better predictions of *behavioural intentions* and *behaviour*. In summary, the *TPB* model states that consumers are more likely to form a preference for, choose, and consume a particular food if (all other things being equal) they believe that:

(i) consumption of that food will lead to particular outcomes or have particular attributes which they value positively;

(ii) if they believe that people whose views they value think they should engage in the behaviour, and

(iii) if they feel that this action is easily brought under their own control.

[8] Behaviour under voluntary control represents behaviour that is consciously thought out before hand.

[9] *Perceived behavioural control* refers to people's perception of the ease or difficulty of performing the behaviour of interest.

Virtues of the multi-attribute attitude theory

The *multi-attribute attitude theory* and it's models opened a completely new window in understanding *how consumer perceives product quality* on several attributes of interest, and *which attributes consumer favours more* in the overall product quality evaluation, as it is more interesting to know how the product is perceived on various attributes than only in the total attitude score (Solomon, Bamossy & Askegaard, 2002). Hence, this theory allowed for a better understanding of which attributes are considered when forming an overall attitude (quality evaluation) towards a product, as well as the relative importance of each attribute to the consumer, and how well each product performs on each owned attribute. Moreover, *TPB* model, with it's constructs, namely, opinions of the consumer's social environment (i.e. *subjective norm*), consumer's *perceived behavioural control*, and consumer's *behavioural intentions*, made a significant contribution to the better understanding and prediction of consumer behaviour (Ajzen, 1991).

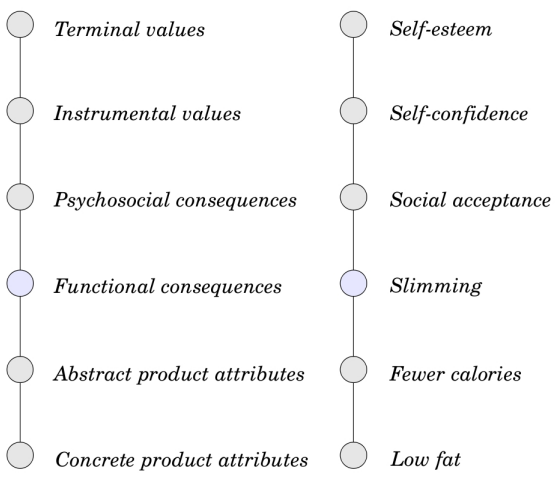
Handicaps of the multi-attribute attitude theory

Despite the fact that the *multi-attribute attitude models* have been widely used in studies of consumer behaviour (Sheppard, Hartwick & Warshaw, 1988; Notani, 1998), they have been also widely criticised. One of the disputed point is that the importance of attributes is presumed to be constant, and not dependent on the context (i.e. purchase or usage situation) (Grunert, 1997), even though context was thought as something that influences the importance of the attributes and quality perception process (Oude Ophuis & van Trijp, 1995). Another disputed point is that these models provide only a restricted view into the quality perception process, where the interrelationship between the attributes was not taken into account (e.g. healthiness → fat) (Brunsø, Fjord & Grunert, 2002). Additionally, they do not provide an answer to the question: *Why certain attributes contribute positively to the overall product evaluation?* Finally, knowledge of the person's attitude is not a very good predictor of a behaviour, showing very low correspondence between consumer's reported attitude towards the observed product and consumer's actual behaviour towards it (Solomon, Bamossy & Askegaard, 2002).

2.3.3 Hierarchical theory

The *hierarchical theory* deals with the interrelationship between different attributes, assuming that consumers infer some attributes from others. This idea was widely explored within the *means-end-chain* (*MEC*) theory which carried a common idea of inferring abstract attributes from concrete product attributes (Gutman, 1982, 1991; Olson & Reynolds, 1983; Zeithaml, 1988). The *MEC* theory produced also a *MEC model*, Figure 2.6, where *means* are seen as events in which buying people engage, whereas *ends* are viewed as valued states of being (i.e. happiness, security).

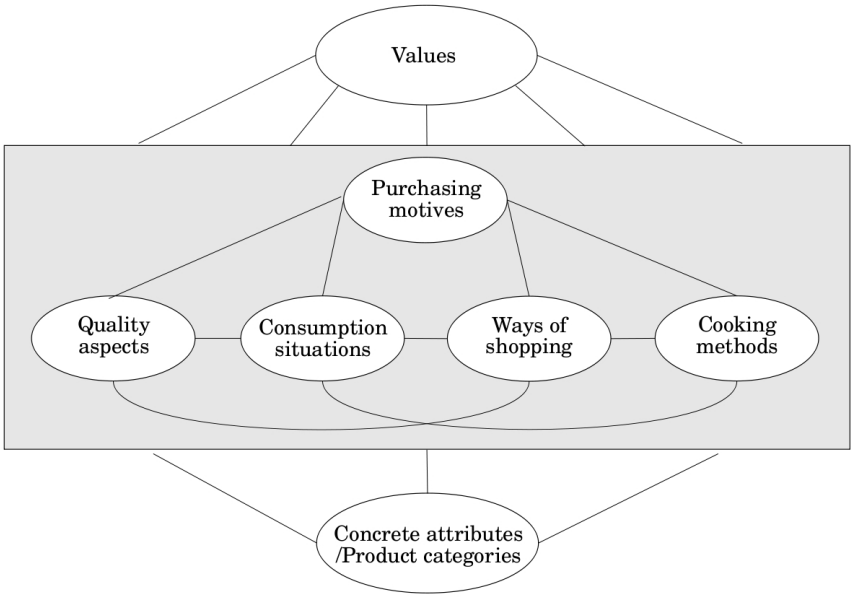
Figure 2.6: *Means-end-chain model: Grunert et al. (1996).*



Thus, consumers' product perceptions are established by the linkage between product attributes and more abstract categories such as values, which actually motivate consumers' behaviour. Product attributes are not relevant itself, but are only relevant to the extent they bring desirable or undesirable consequences for consumers, which are in turn determined by consumers' personal values (Brunsø, Fjord & Grunert, 2002). In other words, the model explains how concrete (or abstract) product characteristic is linked to functional (or psychosocial) consequences of consumption, which in turn may be linked to attainment of instrumental (or terminal) life values.

However, due to its deficiency of including only *declarative knowledge*[10], *MEC model* was extended into a model of *food-related lifestyle* (*FRL*), Figure 2.7, that adds in a *procedural knowledge*[11]. *FRL model* shows that the links between product characteristics and attainment of self-relevant consequences involve besides *declarative knowledge*, also the *procedural knowledge*, which is distinguished between: (i) the knowledge about the *cooking methods* and (ii) the knowledge about *ways of shopping*.

Figure 2.7: *Food-related lifestyle model: Grunert et al. (1996).*



FRL model presents how consumers use *concrete attributes* to infer product *quality aspects*, which in turn have an interdependent relationship to *ways of shopping* and *cooking methods*. Together, *quality aspects*, *ways of shooping*, and *cooking methods* determine the fulfilment of *purchase motives*, which in turn indicate how product help attainment of basic life *values*. Finally, the *consumption situation* has a differentiating influence on *purchase motives*, *quality aspects*, *ways of shopping*, and *cooking methods*.

[10] *Declarative knowledge* represents factual knowledge about things and consequences that can be easily expressed and transmitted between individuals.

[11] *Procedural knowledge* represents the skills a person possesses, normally motoric or perceptual, obtained by training, and difficultly transmitted among individuals.

Virtues of the hierarchical theory

The *hierarchical theory* and *MEC model* have revealed new insights into how different product attributes, i.e. *means*, are inferred and integrated in consumers' valued *end* states, where associations between specific attributes and general consequences can be uncovered. This is of particular relevance for marketing managers, who can use this knowledge to position products by associating physical product aspects with advertising, that seeks to tie product consumption to the achievement of desired-valued states (Gutman, 1982).

Additionally, *FRL model* also brings understanding of how perception of abstract product attributes valued as *means* to an *end* are influenced by the context within which product is engaged (Grunert *et al.*, 1996). In other words, the *FRL model* brings understanding about how *ways of shopping*, *cooking methods*, and *consumption situation* influence consumers' perceptions of abstract product attributes and self-relevant consequences in attainment of *end* values.

Finally, based on this information different consumers' segments can be distinguished according to their ways of shopping, and cooking methods. This model was successfully used in many consumer studies regarding quality perception process of a particular product category (Brunsø, Scholderer & Grunert, 2004a,b).

Handicaps of the hierarchical theory

The major criticism of hierarchical theory and mainly of *MEC model* is that final quality evaluation process remains unclear (Grunert, 1997). Additionally, *MEC model* does not consider how different consumers' skills and expertise, such as ways in which consumers perform product's purchase, and the ways in which consumers prepare and eat the product, influence the final quality evaluation of the product. This is dealt within *FRL model*.

However, even though *FRL model* corrects some of the omissions of the *MEC model*, it suffers itself from some deficiencies. Its major deficiency, lays in the fact that product *quality aspects* are considered in general. Thus, consumer's perceptions of product quality both at the point of purchase and upon consumption are not considered, nor opposed to one another, leaving the final product evaluation fuzzy.

2.3.4 Integrative theory

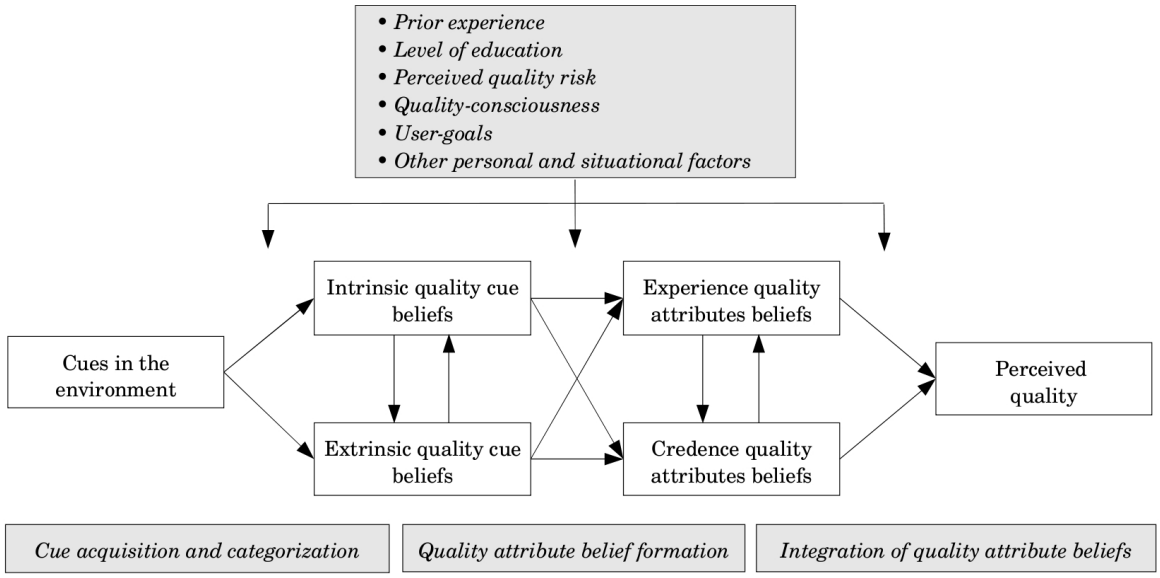
The *integrative theory*, as it name states, integrates some of the approaches from previously presented theory. One of the first attempts to integrate various approaches of consumer-oriented food quality had two stages, in which consumers first choose surrogate indicators of product quality, named *quality cues*, from an array of product-related attributes, and subsequently combine their evaluations of these individual *cues* into an overall judgement of product quality (Oude Ophuis & van Trijp, 1995).

A conceptual model was proposed, that determined factors involved in quality cue choice, and specified cue impact on the overall product quality judgement (Olson & Jacoby, 1972). Finally, the distinction was made between two subjectively determined cognitive dimensions of *quality cues*, called *cue predictive value* and *cue confidence value*, and of the third classificatory dichotomous dimension, called *cue intrinsicness-extrinsicness*.

Based on this work, another more complex *conceptual model of quality perception process* was proposed (Steenkamp, 1989), Figure 2.8. This model assumes that the *quality cues* are concrete

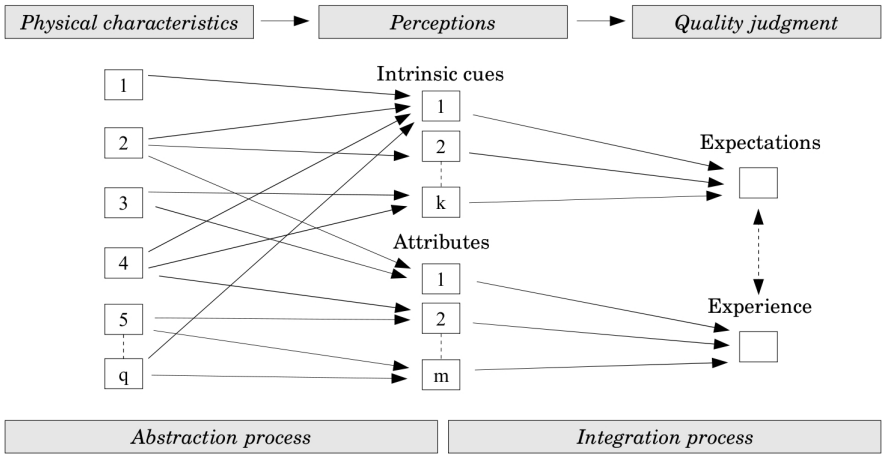
product characteristics that may be observed by a consumer without actual consumption or usage, whereas *quality attributes*[12] are abstract product benefits, experienced by the consumer as a consequence of consumption or usage of the product. Further, the model assumes that overall product quality judgement, i.e. *perceived quality*, is actually based on *quality attribute* perceptions. Moreover, *quality cues* were categorised as either *intrinsic* or *extrinsic*. Finally, in the model distinction was made between *experience* and *credence quality attributes*.

Figure 2.8: *Conceptual model of quality perception process: Steenkamp (1989).*



The conceptual model of quality perception process model served as the basis for the later model called *quality guidance* (QG), which investigated the possibilities of bridging the gap between producer defined quality and consumer based quality perception and implementing this knowledge in production and marketing, Figure 2.9.

Figure 2.9: *Quality guidance model: Steenkamp & van Trijp (1996).*

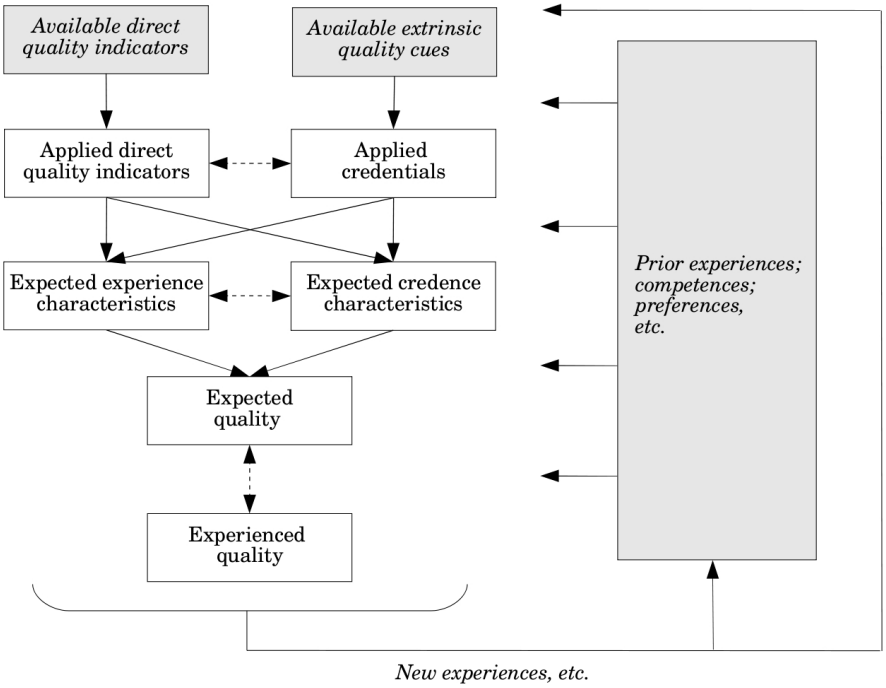


[12]The term *quality attributes* was used here as synonymous to *quality aspects* or *quality dimensions*, see first paragraph of Subsection 2.2.1.

The *QG* model integrates the linkage of physical product characteristics to the consumers' perceived quality judgements, both prior to purchase and upon consumption, Figure 2.9. In the model, *quality expectation* and *quality experience* represent an overall quality judgement that is formed based on *quality cues* (*expectation*) and *quality attributes* (*experience*). In other words, *quality cues* and *quality attributes* represent mediating variables between *physical characteristics of product* and *quality expectations* and *quality experience*. The ultimate goal of the model is to formulate and manipulate technical product specifications in a way of optimisation consumers' quality perceptions.

Another *integrative* approach for analysing the food quality perception process worth mentioning is the model by Andersen (1994), Figure 2.10. In the model, it is assumed that a consumer utilises search characteristics, which are both attributes of the product itself and other (e.g. firm-oriented) attributes, as *quality indicators* of product *qualities* actually sought, which are always *experience* and *credence qualities*. Based on the applied *quality indicators* consumer forms expectations about *experience* and *credence qualities*, which are further aggregated into an *overall expected quality*. The *expected quality* formed in this way can later be compared to *experienced quality* after product is consumed and ingested. In turn, the relation between expected and *experienced quality* will bring adjustments in the way how future quality evaluations will be made.

Figure 2.10: *Model of quality perception process: Andersen (1994).*

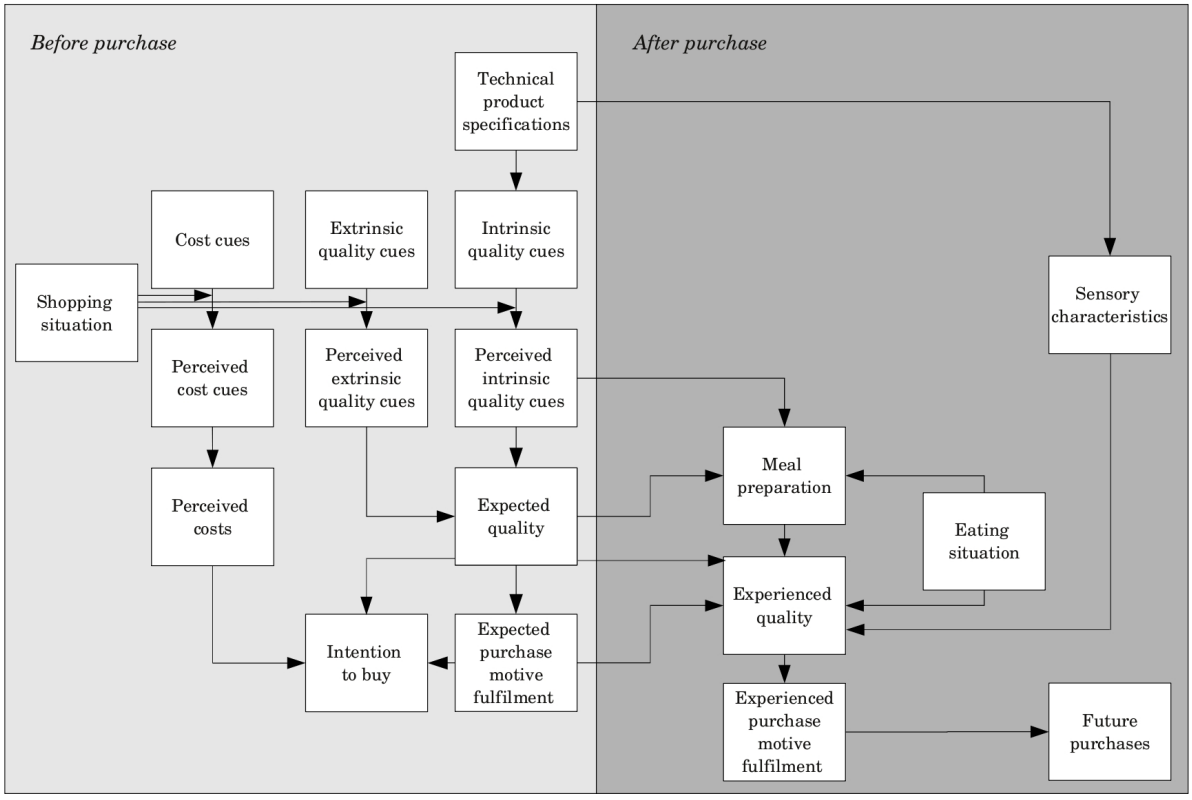


Above all, the model emphasises the importance of *consumer's personal factors*, such as *prior experiences*, *preferences*, among others, as important influential factors in the quality perception process. These *consumer's personal factors* may have the *firsthand* influence on which quality indicators will be selected and applied, as well as which *experience* and *credence qualities* will be sought, and how strong will be the relationship between *expected* and *experienced quality*.

One of the widely used and praised integrative approaches to quality perception process is certainly the *total food quality model* (*TFQM*) (Grunert *et al.*, 1996), Figure 2.11. This model combines all concepts from previously presented theory (Darby & Karni, 1973; Wilde, 1980; Andersen, 1994; Ajzen, 1991; Gutman, 1982, 1991; Oliver, 1980, 1993; Anderson, 1973).

What sets apart *TFQM* from other presented models of *integrative theory* is that it makes distinction between two phases: *before* and *after purchase* evaluations, which contemplated as a whole represent the product quality perception process.

Figure 2.11: *Total food quality model: Grunert et al. (1996).*



In the *before purchase* part, based on the available product characteristics, i.e. *intrinsic* and *extrinsic quality cues*, product *quality expectations* are formed. Most importantly, of all the cues consumers are exposed to, only those which are perceived will have an influence on expected product quality. In turn, the selection and perception of *cues* are affected by the *shopping situation* (e.g. the amount of available information, whether purchases are planned or spontaneous, the pressure of time while shopping).

The model also includes *purchase motives* or value fulfilment, that is, how food products contribute to the achievement of desired consequences and values. In turn, these values (sought by consumers) have an impact on which product *quality aspects* are sought, as well as how different *cues* are perceived and evaluated. Further, the *trade off* between *expected product quality* and *expected fulfilment of the purchase motives* (i.e. positive consequences consumers expect from buying a product) and *perceived costs* (i.e. negative consequences in the form of various, mostly monetary, costs) determines the *intention to buy*.

In the *after purchase* phase, consumer forms a *quality experience*, after consumption and

ingestion of the product. Here, the *experienced product quality* might be influenced by many factors, as *expectation* itself, *product's sensory characteristics*, the *preparation method*, and *situational factors* (e.g. type of meal, the consumer's mood), among others. Finally, the relationship between product *quality expectation* and *quality experience* (e.g. before and after purchase) determines *product satisfaction*, and consequently the probability of *purchasing the product again*.

TFQM has been successfully applied in many consumers studies observing the quality perception process of meat products (Grunert, Bredahl & Brunsø, 2004; Brunsø *et al.*, 2005). Therefore, this model as well as a variation of the other models presented in this Subsection 2.3.4 will be used in this research.

Virtues of the integrative theory

One of the major virtues of these integrative approaches to the quality perception process is that they represent a very useful framework for understanding of the effects of various *quality cues* and *quality aspects* on perceived product quality. Additionally, the presented models fit very well not only into *information theory*, and *multi-attribute attitude theory*, but as well into *means-end chain theory*. Particularly, they claim that consumer's product knowledge is organised in hierarchical knowledge structures or *schemata* (Gutman, 1991; Olson, 1978).

Moreover, perceived product quality is to some degree a global and abstract *end* concept, based on concrete product characteristics, i.e. *means*. This abstraction of perceived product quality brings another useful contribution to distinction between *quality cues* and *quality aspects*. Of course, there are many variations and differences between the models, but despite this fact, each model can be adapted dependent on the purpose of the study. However, one of the most unified frameworks for analysing the quality perception process is certainly the *TFQM*.

Handicaps of the integrative theory

Even though the phenomenon of interrelations between different *quality cues* was recognised a long time ago (Cox, 1967b; Zeithaml, 1988), none of the presented models considers this. Thus, this is one of the obvious handicaps that should be corrected in the future.

Furthermore, despite the fact that the presented *integrative theory* and it's models are very well suited for analysing the quality perception process, they often do not give directly applicable indications for product technical modifications on the basis of perceived consumer quality. In other words, a number of aspects are often missing for guidance of food manufacturers in the design of food products. This is mainly because most of consumer studies that used previously presented models usually generalise their results across the whole product categories, even though it is proven that product quality and perceived quality, in that manner, may vary depending on the type of product being considered.

Finally, product type, and situational and personal factors, as place of purchase and prior product-related experience, are often not considered.

2.4 Empirical research of meat and beef quality

Today, the understanding of consumers' quality perception process, regarding meat in general, and beef in particular, as well as main meat *quality aspects* (i.e. attributes or dimensions) and *quality cues* consumers use to infer these aspects, has become more clear.

Meat quality from a consumer point of view is actually a *multidimensional space*, comprised of an unity of *quality aspects* like sensory[13], healthiness, convenience, and for some consumers - process characteristics like animal welfare and organic production (Grunert, 2006). These *qualities* are mostly unknown to a consumer when purchasing meat, thus they are inferred based on the available information, i.e. *intrinsic* (e.g. fat) and *extrinsic* (e.g. price) *quality cues*.

The mechanisms by which consumers select and use cues to infer quality are at least partly lead by the cues' *accessibility* (i.e. cue familiarity) and *diagnosticity* (i.e. cue predictability) (Dick, Chakravarti & Biehal, 1990). That is to say, the *quality cues* that are most accessible from the consumers' memory and the quality cues that are thought as most relevant or diagnostic are the inputs that are used more frequently by the consumers to infer meat quality. Thus, the usage of *quality cues* is very much dependent on the consumers' prior product-related experience (Bredahl, 2003). In that way, it would be expected that consumers with more product-related experience, i.e. *experts*, might develop stronger perceived correlations between known *quality cues* and meat *qualities* that need to be inferred, than consumers with less prior product knowledge, i.e. *novices*.

The meat (and beef) quality perception was found to be largely based on *intrinsic quality cues*, such as colour, fat, and cut, Table 2.3. However, in some studies, it has been found that even though consumers use *intrinsic cues* as quality indicators of expected meat *qualities*, they have considerable difficulties in forming meat quality expectations in a way that are predictive of later experienced meat *qualities* (Brunsø *et al.*, 2005; Bredahl, Grunert & Fertin, 1998). Nevertheless, does not mean that *intrinsic cues* are not predictable of any meat *qualities* or that the consumers are unable to discern meat quality from available cues. This can be explained by the fact that fresh meat is often sold unlabelled or unbranded, where consumers often cannot be sure if the meat they are repurchasing is from the same source (e.g. production method). Thus, consumers are often forced to use *intrinsic cues* even though they are not certain of their quality connotations. However, when fresh meat is branded or labelled, it would be expected that with increasing product-related experience consumers learn of relevant *intrinsic cues*, which would in turn result in good predictability of the later quality expectations, as shown in some beef studies (Bredahl, 2003).

In the case of unbranded meat products, consumers often relate place of purchase and origin with the higher meat quality (Marreiros, 2002; Glitsch, 2000; Bernués, Olaizola & Corcoran, 2003b). Another important cue that is worth mentioning is price, which is often linked to the meat quality in a *dual-way*. In other words, some consumers link higher-priced meat to a higher quality, while others to a necessary cost (Grunert *et al.*, 2002). This relation again may be influenced by the consumers' product-related experience (Rao & Monroe, 1988).

In consumer research, there is a prevalent voice that the utilisation of *extrinsic cues* for quality evaluation and inference *is* and *will be increasing* (Bernués, Olaizola & Corcoran, 2003a).

[13] *Sensory quality aspects* are used as synonymous for *experience quality aspects*.

The major arguments that explain this occurrence are:

(i) shifting of importance of traditional dimensions (i.e. *experience dimensions*, such as tenderness, juiciness) to recent modish dimensions (i.e. *credence dimensions*, such as healthiness and safety) when evaluating and inferring meat quality, and

(ii) the general trend of increasing interest in *stories* linking *physical products to the consumption experiences that go beyond product basic functions* (Grunert, 2006).

Table 2.3: *List of quality cues, quality aspects and purchase motives.*

Element	***Source***
Intrinsic cues	
• appearance	FG[a]/CS[b]
• fat	FG/CS/LR[c]
• cut	FG/CS/LR
• colour	FG/CS/LR
• meat juice	FG/LR
Extrinsic cues	
• label information	FG/CS/LR
• origin	FG/CS/LR
• quality label	FG/CS/LR
• brand	FG/CS/LR
• information on animal production	FG/CS/LR
• package	FG/CS/LR
• price	FG/CS/LR
Experience aspects	
• taste	FG/CS/LR
• tenderness	FG/CS/LR
• juiciness	FG/CS/LR
• leanness	FG/CS/LR
• wholesomeness	FG/CS/LR
Credence aspects	
• healthiness	FG/CS/LR
• safety	FG/CS/LR
• freshness	FG/CS/LR
• nutrition	FG/LR
Purchase motives	
• appreciation by family	CS/LR
• variation	FG/CS/LR
• convenience	FG/CS
• habit → tradition & security	FG/CS/LR
• special occasions → atmosphere & social life	FG/CS/LR
• acceptable to the guests	FG/LR
• demonstration of cooking abilities	FG/LR
• status	LR

[a]Focus groups & [b]Consumer survey (Project AGRO 422).
[c]Literature review of meat and beef studies using intergrative theory (e.g. Grunert, Bredahl & Brunsø, 2004).

First argument can be demonstrated by a study on beef and lamb conducted in five EU countries (England, Scotland, France, Italy, and Spain), where it was found that, in all EU regions, *extrinsic cues* - origin and deadline (consume by) information, besides information about the system of production, traceability, and quality controls, were mostly searched by consumers concerned with safety and nutrition/health issues (Bernués, Olaizola & Corcoran, 2003b).

Another study on pork meat had similar findings (Grunert *et al.*, 2002). In this study, consumers were faced with a list of 22 potential extrinsic cues of pork meat (majority currently unavailable), where they had to:

(i) indicate if they understand the mentioned cues;

(ii) order perceived cues in order of importance when purchasing pork, and

(iii) indicate five most important cues.

The results showed that the top five extrinsic cues mentioned by consumers (both by knowledge and importance), and in relation to pork meat, were actually related to healthiness and process characteristics, none of them being related to sensory characteristics.

However, this does not mean that the traditional experience dimensions, such as taste, have lost their battle. On the contrary, it only implies that consumers have become more conscious about health and safety issues, due to the constant flow of debate about *pros* and *cons* of eating red meat, and by the various meat scandals. A study from Portugal confirms this, where it was pointed out that the majority of surveyed consumers were cautious about safety (i.e. *BSE* crisis)

and nutrition/health issues (i.e. *cons* of eating red meat) when regarding beef consumption and quality (Marreiros, 2002).

The second argument of increasing importance of *extrinsic cues*, where physical products are linked to more abstract entities that go beyond the product itself and its eating experiences, may be explained by another study on pork (Scholderer *et al.*, 2004). In this study, it was found that consumers believing that they tasted free-range pork actually perceived this meat to be of better quality. Moreover, another study also showed that consumers link organic pork to a whole range of positive inferences ranging from concerns on environment and health to animal welfare and better taste (Grunert, Bredahl & Brunsø, 2004). Moreover, studies from Portugal showed that consumers consider origin and information on the animal breed as the most important cues, that are linked to higher health, safety and sensory beef dimensions (Marreiros, 2002; Marreiros & Ness, 2002). Thus, it seems that origin is used by consumers to make a range of different inferences about meat quality, and *it may appear natural to take this as a starting point for stories about meat products* (Grunert, 2006).

Creative commercials like: *Discover the power of protein in the land of lean beef* (see Figure 2.3), are actually telling the story and motivate the consumer to go beyond the product itself. What adds to this is a study which investigated effects of advertising, in the case of beef, pork, and other meats, and found that advertising has not only a quantity, but also a quality effect on household demand for these meats (Dong, Kaiser & Myrland, 2007).

Thus, stories have become the *key motivation* in making a product purchase. Thereby, in the future those involved in the meat chain will have to use extrinsic information to more elevated levels, becoming in that way storytellers of the *dream society* first and marketeers later (Jensen, 1999). Despite this fact, extrinsic cues, as such, have not yet been widely used on the market place, and in the case of fresh meat, mainly due to the difficulties from the supply side rather than the consumer side.

Quality aspects usually reported in the consumer research on meat, are taste, tenderness, juiciness, leanness, freshness, and nutritional value (Grunert, 1997; Bredahl, 2003; Steenkamp & van Trijp, 1996). Safety, healthiness, and wholesomeness add to these dimensions (Bernués, Olaizola & Corcoran, 2003a; Bredahl, Grunert & Fertin, 1998), Table 2.3. Similarly, consumer research regarding beef in Portugal also showed that freshness, taste, tenderness and safety are the most important aspects of beef's good quality (Marreiros, 2002). Most of the mentioned studies assume that the meat *quality aspects* are actually the same both when purchasing and consuming meat. In other words, it is hypothesised that the evaluated meat qualities are the same for the formation of expectations and the formation of experiences.

Nevertheless, the dimensionality of beef quality and the weights of various *quality aspects* before and after meat consumption may differ. Thus, in the study on beef in four EU countries, it was found that consumers perceived beef quality as one-dimensional (i.e. consisted of both *sensory* and *credence quality aspects*) in Germany, Spain and the UK, while in France beef quality was found to be two-dimensional, where a distinction was made between *sensory* and *credence quality aspects* (Grunert, 1997).

Other studies conducted in Denmark confirmed the French case and suggested that consumers perceive beef quality as a two-dimensional construct, one covering credence aspects and one consisting of sensory aspects (Brunsø *et al.*, 2005; Bredahl, 2003). Likewise, in another

study with regard to pork meat, results suggested that *expected quality* was one-dimensional, while *experienced quality* turned out to be two-dimensional, comprised of health and sensory quality (Bredahl, Grunert & Fertin, 1998).

Furthermore, *quality aspects* accessible to the senses, such as taste, tenderness, and juiciness may carry more weight in the quality experience phase, than those *quality aspects* that are not, as healthiness and nutrition (Grunert, Bredahl & Brunsø, 2004). This is obvious since in the consumption phase *sensory quality aspects*, which are expected in the shopping phase, can be confirmed or contradicted by its quality experience, while *credence quality aspects* cannot. Finally, this confirmation or disconfirmation of mainly *expected sensory aspects* represents the major determinant of consumer's satisfaction and his/her intent to repurchase the meat product or not (Oliver, 1980, 1993; Anderson, 1973).

Worth mentioning here that consumers' *purchase motives* may influence expected meat quality, as well as intention to buy meat. In fact, it has been shown, in a case of beef, that purchase motives, namely *tradition* and *security*, *variation* (in preparation), *atmosphere* and *social life*, *acceptability to children*, *acceptability to guests*, *demonstration of cooking abilities*, and *status*, may affect consumers' quality perception of beef, however they are very difficult to model (Grunert, 1997), Table 2.3.

Contexts within which product and consumer are engaged, that is *shopping* and *consumption situations*, were also found as important factors in quality perception of meat in general, and beef in particular (Dransfield *et al.*, 2000). However, even though there are studies that test the influence of consumption and shopping situations on consumers quality experience, it is not easy to measure the impact of consumption and shopping situation on meat quality (Bredahl, 2003; Grunert, 2006).

Finally, the way a piece of meat is prepared can influence quality experience, where a good piece of meat can be ruined by poor cooking procedures (Wood *et al.*, 1995). Despite this fact, the impact of cooking methods, and cooking skills in that manner, is not easy to measure with regard to consumers, and various attempts have not yet led to clear results (Grunert, Bredahl & Brunsø, 2004).

Based on what has been said so far, and in the case of beef, studies that explore beef quality perception as a whole, both before and after beef consumption, are relatively rare. Majority of studies are more exploratory, and do not make a distinction between expected and experienced beef quality (Marreiros, 2002; Marreiros & Ness, 2002; Glitsch, 2000; Becker, 2000).

On the other hand, when an integrated analysis of expected and experienced quality is undertaken it is often in connection to controlled settings (Brunsø *et al.*, 2005), and not to real purchase environment (Bredahl, 2003). However, when undertaken, it is usually with regard to unbranded/unlabelled beef and across a product category (Acebrón & Dopico, 2000).

Moreover, there are almost no studies that compare expected and experienced quality between beefs from different production methods, albeit it has been shown that these can influence both appearance and experienced quality of beef (Oliver *et al.*, 2006). Further, possible influence of extrinsic cues on perception of intrinsic cues and expected beef quality also remains unexplored, even though it has been shown that interrelation between extrinsic and intrinsic cues might exist (Grunert, 1997).

Finally, despite the fact that product-related experience has been found as a key factor in cue search, recall, and use, as well as product perception process (Rao & Monroe, 1988; Johnson & Russo, 1984; Park & Lessig, 1981), there has been relatively little empirical research on the impact of product-related experience on cue utilisation and beef quality perception.

2.4.1 Statistical techniques in consumer research on meat and beef quality

There is an ample room of statistical techniques used in consumer research on meat and beef quality, that may be broadly classified as *univariate* and *multivariate* techniques, depending on the nature of the research. *Univariate* techniques are used when there is a single measurement of each element in the sample or there are several measurements of each element, but each variable is analysed in isolation (Malhotra, 2007; Aaker, Kumar & Day, 2004). On the other hand, *multivariate* techniques are utilised when there is a need to simultaneously analyse multiple measurements on each individual element under research (Hair *et al.*, 2006).

The *univariate* and *multivariate* techniques can be further sorted whether the data are *metric* or *nonmetric*. *Metric* data are measured on an interval or ratio scale, while *nonmetric* data are measured on a nominal or ordinal scale. Furthermore, these techniques can be classified depending on the number of samples involved (i.e. one or more samples), where *univariate* techniques with two or more samples may be classified as *independent* and *related* techniques.

Multivariate techniques can also be organised as *dependence* or *interdependence* techniques. *Dependence* techniques include one or more dependent variables and the remaining variables as independent, while *interdependence* technique variables are not divided into dependent and independent groups, but rather are analysed as a single set.

Table 2.4 depicts some of the statistical techniques used in the consumer research on meat and beef quality. Besides normally used *univariate* independent techniques, such as one-way *ANOVA* and χ^2-test, most commonly utilised multivariate techniques in the studies are *factor* and *cluster* interdependence analysis. In addition, *multiple regression* and *probit/logit models* are multivariate techniques also used in the research.

Most recently, multiple dependent/independent variable relationship techniques, like *structural equation modelling* (*SEM*) add to this group. *SEM* is a very suitable and effective estimation technique that combines aspects of *multiple regression* (i.e. dependence relationship) and *factor* analysis (i.e. unmeasured factors with multiple variables) to estimate a series of interrelated dependence relationships simultaneously (Hair *et al.*, 2006).

Moreover, SEM gives the researcher more flexibility than any other multivariate technique, and when applied correctly, provides a strong confirmatory test to a series of causal relationships. An alternative technique to *SEM* is the *partial least squares* (*PLS*) technique, where some feel that *PLS* is better suited for exploration of smaller data samples.

Hence, in this research, multivariate techniques, like *factor* analysis, *SEM* and *PLS*, will mainly be used for the estimation of the hypothesised *beef quality models*, as these techniques are better suited for this kind of analysis.

Table 2.4: *Statistical techniques of empirical studies on meat and beef quality.*

Author	***Study***	***Objective***	***Approach***	***Technique***
Acebrón & Dopico (2000)	Beef	• Importance of intrinsic and extrinsic cues to expected and experienced quality	Integrative[a]	*Multiple regression*
Becker (2000)	Beef Pork Chicken	• Importance of intrinsic and extrinsic cues for meat quality	Exploratory	*Wilcoxon signed-rank test*
Bernués, Olaizola & Corcoran (2003a)	Beef Lamb	• Importance of extrinsic quality attributes	Exploratory	χ^2*-test* *Factor analysis* *Cluster analysis*
Bernués, Olaizola & Corcoran (2003b)	Beef Lamb	• Identification of type of labelling information demanded by meat consumers	Exploratory	χ^2*-test* *Factor analysis* *Cluster analysis*
Bredahl, Grunert & Fertin (1998)	Pork	• Relation between consumers' perceived pork quality and psychical product characteristics	Integrative *TFQM*, Figure 2.11	*Pearson correlation coefficient* *Factor analysis* *SEM*
Bredahl (2003)	Beef	• Investigation of cue utilisation and quality perception with regard to branded beef	Integrative *TFQM*, Figure 2.11	*Factor analysis* *SEM*
Brunsø *et al.* (2005)	Beef	• Analysis of consumers' perceptions of beef quality resulting from various fattening regimes	Integrative *TFQM*, Figure 2.11	*Factor analysis* *SEM*
Glitsch (2000)	Beef Pork Chicken	• Evaluation of consumers' perceptions of meat quality	Exploratory	*t-test* *Factor analysis*
Grunert (1997)	Beef	• Evaluation of the consumers' beef quality perception in a purchase situation	Integrative[b] *TFQM*, Figure 2.11	*Conjoint analysis* *Factor analysis* *SEM*
Marreiros (2002)	Beef	• Examination of consumers' attitudes	Exploratory	*One-way ANOVA* *Factor analysis* *Cluster analysis*
Marreiros & Ness (2002)	Beef	• Analysis of consumers' perceptions of *PDO* label	Exploratory	*One-way ANOVA* *Factor analysis* *Cluster analysis*
Oliver *et al.* (2006)	Beef	• Evaluation of eating quality of meat from different production systems	Exploratory	*One-way ANOVA* *Pearson correlation coefficient*
Steenkamp & van Trijp (1996)	Beef	• Identification of the relevant dimensions of perceived quality, its relation to the physical product characteristics	Integrative *QG model*, Figure 2.9	*Factor analysis* *PLS*
Verbeke & Viaene (1999a)	Beef	• Examination of effects of consumer involvement in fresh meat	Exploratory	*One-way ANOVA* χ^2*-test* *Factor analysis* *Cluster analysis*
Verbeke & Ward (2006)	Beef	• Analysis of consumer interest in information cues denoting quality, traceability and origin	Exploratory	*Ordered probit model*

[a] Model based on Wierenga (1982).

[b] Only expected quality observed.

In order to make an apple pie from scratch,
you must first create the universe.

- Carl Sagan -

3

Objectives, design and organisation of the thesis

The stimulus for this research was twofold:

- First, as a reaction to the beef market challenges, namely concerning beef demand, the need was born for a real knowledge on the consumers' beef quality perception process. Thereby, taking the Portuguese consumer as the ultimate arbiter of beef quality, market competitiveness could be achieved through a deeper knowledge of consumers' attitudes, tastes and preferences.
- Second, the need to answer to some of the major gaps in the consumer-oriented approach to food quality, namely:
  - the observation of the quality perception process in controlled settings;
  - the generalisation of findings across products and contexts involved;
  - the partial observation of the quality perception process (either before or after product consumption);
  - the incomplete evaluation of the product-related experience impact on consumers' quality perception process, and
  - the insufficient investigation on the interrelations between different quality cues.

Facing this, the main goal of this work is to provide a better understanding of the overall framework of the Portuguese consumers' beef quality perception process, and to investigate associations between perceived beef quality, choice cues, and previous product-related experience, taking in consideration different animal production methods, the particular beef product and a real-market environment.

Hence, the specific objectives of this research are:

- to access how Portuguese consumers perceive beef quality and which *qualities* are important in this process both when buying and consuming beef;
- to uncover the quality aspects consumers associate with the quality of beef;
- to uncover how expected beef quality is formed based on the available and perceived intrinsic and extrinsic cues;
- to analyse and measure interrelations between extrinsic and intrinsic cues;
- to measure quality that is actually experienced when consuming beef;
- to measure the relationship between expected and experienced beef quality;
- to understand how is the relationship between expected and experienced beef quality related to future beef purchases;
- to understand the influence of product-related experience on cue utilisation and beef quality judgement;
- to assess whether consumers with high and low product-related experience (i.e. experts and novices) differ in their choice of quality cues and overall quality judgement when evaluating beef quality, and
- to compare consumers' quality perception process of different beef brands.

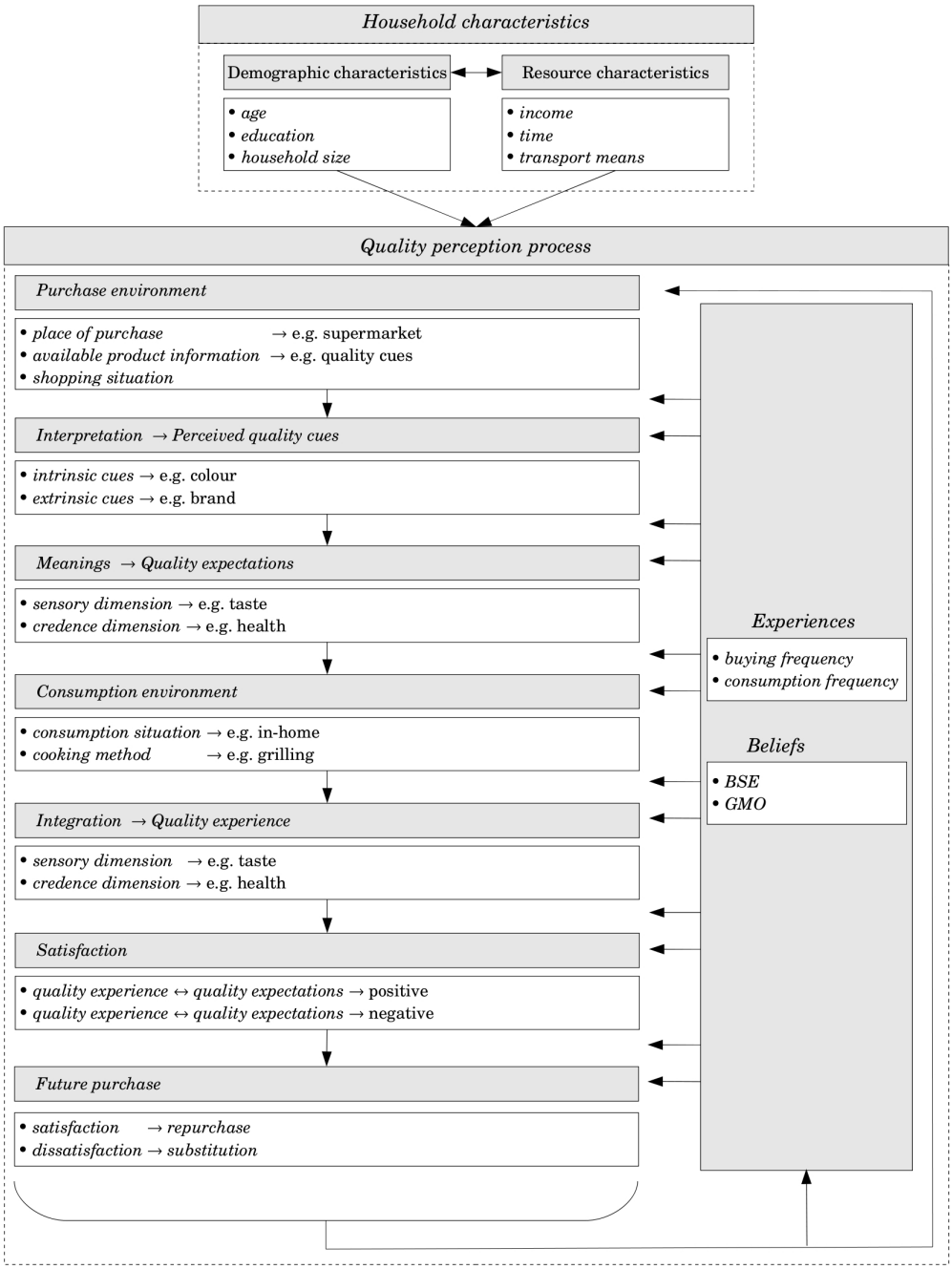
These are all the specific objectives of the research programme developed, which is mainly based on the integrative approach to consumer's quality perception process (see Subsection 2.3.4) and represents the heart and bone of this work, that will be explained in more detail in *Part IV* of this thesis.

In order to implement the above-listed objectives, the present research follows the design depicted in Figure 3.1. This framework shows how consumers are characterised by the organisational characteristics of the household: *demographic* and *resource* characteristics, which are at more general level exercising the constraining influence on consumer behaviour, i.e. quality perception process.

The quality perception process is further influenced not only by consumers' *organisational characteristics*, but also by consumers' *knowledge/experience* obtained through prior product search, purchase, and consumption.

In the *interpretation process*, available information from the environment affects the consumers' cognitive structures, and in the *integration process* information from the environment is processed by consumers leading to the perception process, preference formation, and finally to purchase and consumption behaviour.

Figure 3.1: *Conceptual framework for the consumer trials.*



To be able to correctly develop the research design depicted in Figure 3.1 and achieve the above-mentioned specific objectives of this work, it would be of outmost importance to characterise:

- the evolution of meat and beef consumption and expenditure in Portugal;
- Portuguese beef supply and trade balance, and
- the Portuguese consumer behaviour towards beef.

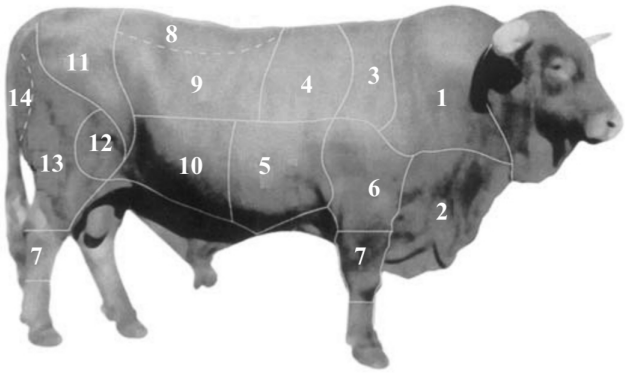
These were the main objectives of Project AGRO 422, that was undergoing at that time on *Faculdade de Medicina Veterinária* (*FMV*) and *Instituto Superior de Agronomia* (*ISA*), and in which the researcher was deeply involved. Hence, the present research unfolds around the structure presented in Section 3.1, Figure 3.3, where *Parts II* and *III* were performed within the Project AGRO 422.

More specifically, in order to comprehend who Portuguese beef consumers really are, and to understand the surroundings in which they make beef purchases, it would be necessary to describe and analyse Portuguese consumers' expenditure and consumption trends and various factors influencing these trends, including demographic and socio-economic factors, as well as the effects of different crises, like *BSE*, and the tools used to address them (*Part II* of this thesis).

In addition, in order to determine Portuguese consumers' major requirements towards beef quality, it would be important to identify the most important attributes that consumers consider in beef, as well as their attitudes related to both beef in general, and labelled beef in particular. Moreover, in order to have a more complete picture of the beef market, it would be interesting to examine the behaviour of major beef market players. These analyses would allow a deeper understanding of the Portuguese consumers' preferences and attitudes towards beef, as well as if these were considered, or not, by the major retailers of the Portuguese market (Part *III* of this thesis).

Based on the insights from the mentioned project, *strip loin* muscle beef steaks[1] (see Figure 3.2) from three different production methods and branded differently were selected for the research to be implemented at a supermarket in the region of *Lisboa e Vale do Tejo*.

Figure 3.2: *Commercial joints of beef carcass according to the Lisbon-type cut: Carolino et al. (2006).*



1 → neck
2 → brisket
3 & 4 → forerib + cubroll
5 → forequarter flank
6 → shoulder
7 → foreshin + shank
8 → tender loin
9 → strip loin
10 → flank
11 → silverside
12 → knuckle
13 → rump
14 → topside

This selection was in accordance with previous Portuguese beef studies (Marreiros, 2002; Marreiros & Ness, 2002) and research undertaken on Portuguese household consumption expenditure (Banović, Barreira & Aguiar Fontes, 2006a) (see *Part II*, Chapter 4). According to this latter study, households with a higher share of total meat spending on beef are mostly those

[1] According to Lisbon-type cut, commercial joints of beef carcass are grouped in five commercial categories: (i) superior joints (tender loin & strip loin); (ii) first class joints (silverside, topside, knuckle, rump, forerib + cubroll, & shoulder); (iii) second class joints (neck, foreshin + shank, & flank); (iv) third class joints (brisket & forequarter flank), and (v) premium joints (tender loin, strip loin, silverside, & topside). Premium joints of beef carcass have the greatest commercial value (Carolino, 2006).

from the region of *Lisboa e Vale do Tejo*, with medium to higher income, higher literacy levels, and average age between 30-64 years. Moreover, this particular supermarket was selected since: (i) branded beef, particularly with a quality label like *PDO*, is mainly marketed through these type of retailers (Banović *et al.*, 2008) (see *Part II*, Chapter 7); (ii) this supermarket was located in a Portuguese district that covers households with different income and literacy levels; (iii) in this supermarket beef steaks under study were bought regularly, and (iv) the logistic of the trial could be better implemented, as the supermarket had the convenient area and design.

The data was collected through means of questionnaires, which were designed based on a preliminary research (Aguiar Fontes *et al.*, 2008; Banović *et al.*, 2006b; Aguiar Fontes, Banović, Lemos & Barreira, 2009) (see *Part III*, Chapters 8 and 9) and on an exhaustive literature review (see Section 2.4 and Table 2.3).

Consumers' trials at the supermarket (see *Part IV*) were implemented using questionnaires and through personal interviews in two phases: (i) at the beef purchase point, i.e. in the real purchase environment, and (ii) after a blind-test, i.e. controlled setting. Consumers' trials also included a third phase at consumers' homes using a self-administrated questionnaire, that consumers' were supposed to fill-in after consumption of the beef steaks purchased at the supermarket. The employed questionnaires quantitatively explored the socio-economic characteristics of the consumers, their claimed behaviour and perceptions related to beef.

This gathered information was further used as the database for building the various *beef quality models* for Portuguese consumers. *Structural equation modelling* (*SEM*) and *partial least squares* (*PLS*) were applied to these models which characterise the Portuguese consumers' beef quality perception process.

This research should shed more light on several theoretical and methodological issues regarding the consumers' quality perception process. Theoretically, the insights gained will bring a greater comprehension of the interrelations between extrinsic and intrinsic cues, of the way they are perceived and used to infer expected quality, as well as of the relation between expected and experienced quality, and how this relation affects future purchase intention. Furthermore, the analysis of product-related experience impact on cue usage and product quality judgement, as well as the comparison of consumers' quality perception process of different product brands, will introduce the new theoretical guidelines into the consumers' quality perception process.

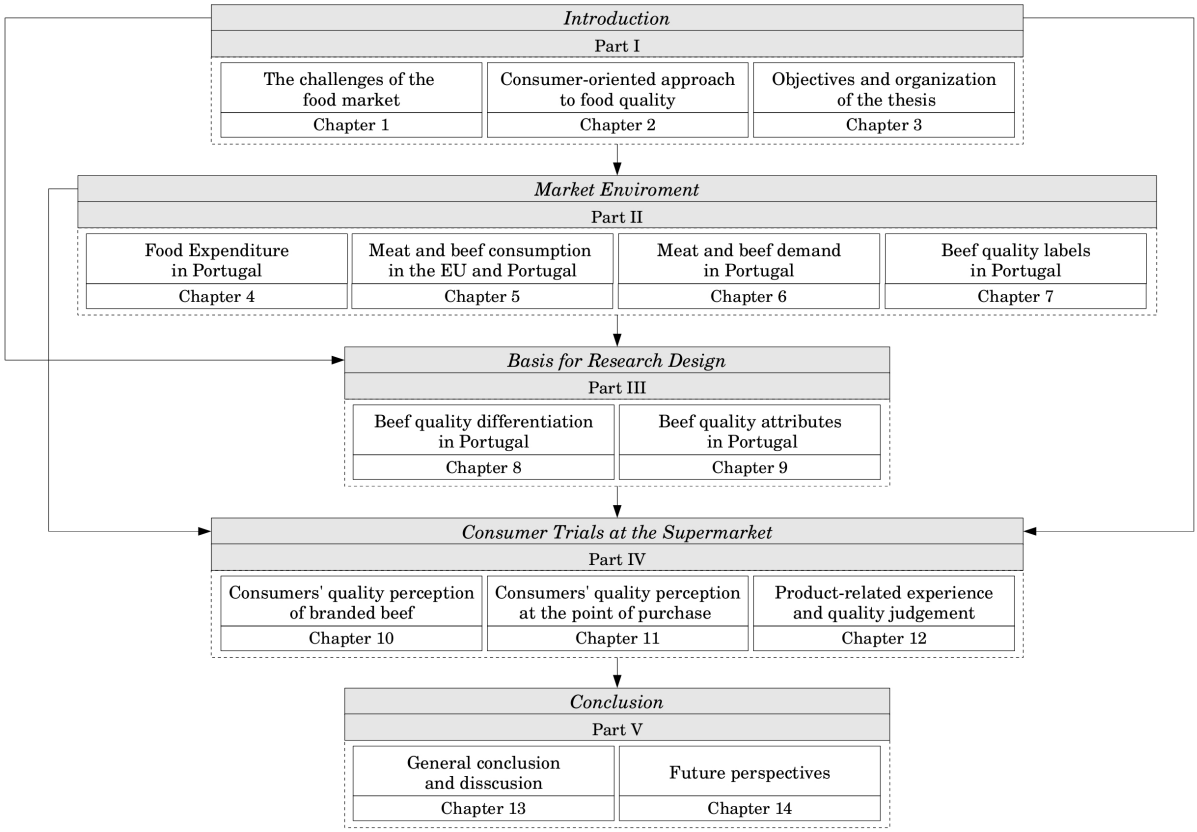
Methodologically, this research should open new grounds on the assessment of the consumers' quality perception process in a real-life environment, i.e. both when purchasing and consuming a particular product. Further, the quantitative estimation and one-step testing of the existing theory (see Subsection 2.3.4, Figure 2.11) and the proposed model (see Chapter 12, Figure 12.1) by using *structural equation modelling* should give new pathways in the application of the integrative models to the analysis of quality perception of food, and beef in particular.

Moreover, this research can bring several practical benefits for those enrolled in the beef chain. Particularly, an increased understanding of the beef market will help producers to position their products and target their markets better. Finally, results from this thesis may be informative with regard to the development and communication strategies in the beef sector, where these results may be captured by creative marketing for product development and/or innovation and used as a potential impact factor that can affect consumers' beef buying behaviour and the quality perception process.

3.1 Organisation of the thesis

Having in mind what has previously been said, the present thesis is comprised of five parts, Figure 3.3.

Figure 3.3: *Thesis structure.*



Part I - Introduction - covers the challenges facing today's food market, and gives an exhaustive literature review on consumer-oriented approaches to food quality.

Part II - Market environment - is divided into four chapters.

Chapter 4 - analyses the major trends of Portuguese household food expenditure per different food groups, particularly meat and its main substitutes, and takes into account household food expenditure at home and away from home.

Chapter 5 - presents comprehensive overview of the meat and fish consumption in the EU and Portugal, and undertakes a brief literature review on what have been considered as major determinants of meat consumption.

Chapter 6 - analyses the evolution of meat demand in Portugal and the effects of the crises occurred in the meat sector. The effects of the crises on meat and beef demand are estimated using *almost ideal system of demand functions* (*AIDS*).

Chapter 7 - characterises the beef market in Portugal, and quality labelled beef market in particular, highlighting some of the major requirements for the positive impact of marketing tools, such as specific quality labels like *PDO*.

This preliminary analysis of the first two parts of the thesis will enable a better understanding of the Portuguese consumers and of the beef market.

Part III - Basis for Research Design - embodies two chapters.

Chapter 8 - analyses Portuguese consumer and distributor's market surveys, and the sensory analysis undertaken with particular quality beef. Moreover, it contributes for the discussion around beef differentiation in order to improve market competitiveness.

Chapter 9 - examines Portuguese consumers' perceptions, attitudes, and preferences towards beef in general and *PDO* beef in particular, underlying the importance of certain product attributes in beef differentiation.

This part as preliminary research on Portuguese consumers' beef preferences and attitudes allows for some qualitative hypothesis, and together with the first part served as a basis for the research design of this work.

Part IV - Consumer Trials at the Supermarket - represents the *heart* and *bone* of this thesis, and it is comprised of three chapters.

Chapter 10 - investigates differences in consumers' quality perception process of beef steaks from strip loin muscle regarding three different types of cattle breeds and production methods. Moreover, this chapter introduces three different models of Portuguese consumer quality perception process pertaining to each beef considered, and analyses each model by means of *partial least squares* (*PLS*).

Chapter 11 - inquires how Portuguese consumers perceive beef quality in a real-life purchase environment, which intrinsic and extrinsic quality cues consumers use when evaluating and forming beef quality expectations, and how extrinsic quality cues influence the perception of intrinsic quality cues. Furthermore, this chapter investigates how quality expectations are related to quality experience and future purchase intention after blind-tasting of beef steaks. Finally, the chapter presents different models of consumers' quality perception process with respect to interrelations between extrinsic and intrinsic quality cues, and studies these relations by employing *structural equation modelling* (*SEM*).

Chapter 12 - examines how does prior product related experience influence Portuguese consumers' cue utilisation and beef quality perception process. Moreover, this chapter introduces conceptual model of consumers quality perception process and analyses this model with respect to both expert and novice Portuguese consumers using *multiple-group SEM*.

Part V - Conclusion - summarises the main conceptual and empirical findings of this research, discusses its limitations and proposes several pathways for future research in the area of consumers' quality perception process.

Part II

Market Environment

First things first.
- Ken Garland -

The aim of this chapter is to highlight major trends of Portuguese household food expenditure in 1990, 1995 and 2000. Food expenditure trends per food groups are examined taking into account household food expenditure at home, and away from home, and based on different variables. Results suggest that income, education and age, are influencing changes in Portuguese food spending behaviour. The pattern observed in Europe in terms of an increasing trend towards food away from home can also be confirmed for Portugal.

4

Food expenditure in Portugal: 1990, 1995, and 2000[1]

4.1 Introduction

Household demand for food is related to the level of income, food prices, preferences and demographic variables like family size, population and age structure. As income rises the share devoted to food is becoming smaller. Extra income is used for other goods rather than food and diet becomes more diverse and devoted towards premium and higher quality products.

Socio-demographic changes such as smaller household size, greying population, increasing proportion of working women, changes in values and lifestyles, concerns about the health and safety of food products as a result of more product information and better education, are all influencing food consumer behaviour. It can also be added the recent food scares and the media effect. All these mentioned factors have a considerable impact on household wants and needs with respect to food products, implying significant differences amongst households.

The aim of this chapter is to highlight major trends of Portuguese household food expenditure, and in its components: *food at home* (*FAH*) and *food away from home* (*FAFH*), in 1990, 1995 and 2000. These trends are analysed considering socio-economic variables such as region, level of income, age and literacy level of the head of the household. Furthermore, an attempt is made to identify expenditure trends in some food groups, particularly meat and its main substitutes, as this work is included in a broader project (Project AGRO 422), therefore the more in depth look at these goods.

The information used, provided by the *household budget survey* (Inquérito aos orçamentos familiares, INE, 1992b, 1997, 2002b) and undertaken in the years of 1989/90, 1994/95 and 2000, with a sample of approximately 12 thousand households in each year, is a rich source of information on spending patterns of Portuguese households. This database, expressed in terms of average annual expenditures per household, provides information in aggregate terms. Therefore a descriptive analysis is undertaken allowing for the identification of major patterns

[1]This chapter has been published as: Banović, M., Barreira, M.M. & Aguiar Fontes, M. (2006a). Portuguese household food expenditure: 1990, 1995 and 2000. *New Medit*, *2*, 25-31.

in Portuguese food expenditure, and in its two components (*FAH* and *FAFH*), throughout the nineties[2].

The main research questions to be analysed can then be expressed as:
• Do household food expenditure patterns tend to become more similar as time goes by?
• Are we assisting in Portugal to an increasing trend towards *FAFH*, following the general tendency across Europe?
• What happens in terms of expenditure per food products?

4.2 Background

The most recent published information shows that household level of real net income, in Portugal, increased by 38% between 1990 and 2000 (INE, 2002b). With rising income different attributes are relevant in food choice, as the influence of intangible factors become more important than price as major drivers in purchasing decisions (Fearne & Bates, 2000; von Alvensleben, 1997; Ray & Hughes, 1994). Meulenberg and Viaene (1998) suggest that consumer demand for quality is more sensitive to income changes than demand for food (in quantity terms). Nevertheless, income and prices still continues to be significant factors influencing the Portuguese household food budget (Barreira & Vicente, 2001).

According to Stewart and Yen (2003), household production theory postulates that consumption costs includes prices as well as time allocated to food preparation, eating, and cleaning up after the meal. Therefore the consumer has to make a choice, whether to spend time and prepare *food at home* (*FAH*) or to go for *food away from home* (*FAFH*). Nayga (1996) argues that the higher the proportion of time wives spend in the labour market, the higher the family's expenditures on prepared food and *FAFH*.

Saving time and effort, namely convenience, seems to be taking a significant place in consumer food choice and behaviour (Brunsø, Fjord & Grunert, 2002). Consumers are turning to more convenient and processed food, which are, in fact, more added value products, hence avoiding extra effort devoted to preparing food (Gracia & Albisu, 2001). Convenience for consumers represents an effort that they have to make in preparing the food, so for them it is not only saving time, but also saving mental and physical energy (Brunsø, Fjord & Grunert, 2002).

Some results suggest that with more labour participation of the household members there may be less time available for meal preparation, so households with working managers are more likely to transfer *time spent for household production to time spent for leisure* (Byrne, Capps & Saha, 1998). In the European Union, as a consequence of the increase in working women, and reflecting the higher demand for convenience, we assist to a higher demand for ready to eat meals and eating away from home (Gracia & Albisu, 2001), though the magnitude of this effect will be greater for food away from home as argued by Nayga (1996). A positive correlation between the proportion of working women and consumption of frozen foods was confirmed by Steenkamp (1997), and between working women and time saving, since women are still the main family planner (Gracia & Albisu, 2001). Similar conclusions are reached by Manrique and Jensen (1998), Jensen and Yen (1996), and Yen (1993). In Portugal, we have assisted, between 1990 and 2000, to an increase of 16% in the number of working women, which accounted, in

[2]All the calculations undertaken on the basis of Inquérito aos orçamentos familiares (INE, 1992b, 1997, 2002b). Values deflated by the *consumer price index*, base 2000.

2000, for 45% of the total labour force (INE, 2004c); therefore this might have implied a change in the consumption patterns.

Household size plays an important role in food expenditure, as shown by the fact that smaller ones spend more on *FAFH* (Stewart & Yen, 2003). Average Portuguese household size is slightly decreasing, from 3.1 heads per household in 1990 to 2.8 in 2000 (INE, 1992b, 1997, 2002b). Household composition and age of the meal planner seem to be other important factors in food spending: *households with older meal planners and young children appear to display reduced levels of FAFH expenditure* (Mihalopoulos & Demoussis, 2001).

Portuguese population grew by 4% from 1990 to 2000, but with a decrease of young people ageing less than 14 (-20%) and a growth of elderly ageing 65 and over (29%), while the age group between 15 and 64, grew only slightly (7%). Some authors argue that with ageing populations less potential consumers for *FAFH* can be expected (Blisard *et al.*, 2002). Nayga (1996) showed that families with older wives tend to spend more on food prepared at home than other households.

Older consumers tend to eat a lesser amount of food and to have a lower energy intake in their diets. Very often this is linked to health concerns and they tend to eat more fruits and vegetables and less fat (Gracia & Albisu, 2001; Harris & Blisard, 2002; Nayga, 1995). Nayga and Capps (1995) also pointed out that age plays a significant role in fish and shellfish consumption, both at home and away from home, and that these products' sales should be targeted to the elderly. On the opposite, other studies suggest that there is no difference between the food consumption pattern of elderly people and the other age groups, apart from the fact that they generally need lesser amounts of food (Senauer, Asp & Kinsey, 1991).

Consumers tend to understand and integrate information with increasing literacy levels. Several studies showed that the level of literacy is an important factor in *FAFH* and prepared food (Nayga, 1996; Stewart & Yen, 2003; Mihalopoulos & Demoussis, 2001). Sabates, Gould and Villarreal (2001) found that educational attainment do influence food expenditure, in the way that higher education levels have a positive impact on expenditures, which may imply an increase in the demand for food quality.

Level of literacy, measured in years of schooling, is rising in Portugal. The proportion of Portuguese population with *high*[3] level of literacy has increased in Portugal (from 6% in 1991 to 11% in 2001), particularly evident in women. Therefore, it can be expected a higher demand for *FAFH* in Portugal, though some studies found education variables to be insignificant (Meulenberg & Viaene, 1998; Yen, 1993).

Changes in values, defined by Meulenberg and Viaene (1998) as *mental representation of important life goals that consumers are trying to achieve*, and changes in lifestyles defined by Engel, Blackwell and Miniard (1995) as *patterns in which people live and spend time and money*, have a great impact on food consumption and, consequently, on food expenditure. Heilig (1993) suggested that three major trends of food preferences are related to changing values and lifestyles, namely: (i) the shift from traditional food towards finer, industrially produced food; (ii) the elimination of the seasonal cycle in food consumption, and, finally, (iii) the move towards *exotic food*, influencing the higher demand for convenience in shopping, cooking and consumption.

[3] *High* level of literacy includes those with a bachelor or higher degrees.

Studies looking at regional effects on households food expenditure, have shown that household location *has an impact on both FAH and FAFH expenditures*, reflecting differences in tastes, preferences, prices, tax structure, lifestyle, advertising, etc. (Manrique & Jensen, 1998; Byrne, Capps & Saha, 1998).

In the light of this literature review the analysis of major trends on Portuguese household food expenditure, in its two components: *FAH* and *FAFH*, is now undertaken, for three moments in time (1990, 1995, and 2000).

4.3 Changes in food expenditure in Portugal

Food expenditure is defined here as the result of *FAH* and *FAFH* expenditures. *FAH*[4] is considered to be composed of six food groups: meat products; fishery products; milk, cheese and eggs; fruits; vegetables; and other food products[5], and *FAFH* is defined as the summation of expenditure on *commercial* (restaurants and cafés) and *non-commercial* food-services (canteens). Data was adjusted using the *consumer price index*[6], base 2000 (INE, 2002a), which allowed us to examine and evaluate trends in real terms.

Share for food in total household spending has declined from 39% in 1990 to 27% in 2000, possibly explained by the increase in the net disposable income during the period 1990-2000[7]. This is not surprising and confirms the fundamental principle of economics, widely known as *Engel's law* implying that the increase in income brings forth a less than proportionate demand for all food products or, in other words, that the proportion of income spent on food products declines as income rises (Ritson, 1988).

Concerning the period 1990-2000, food spending in real terms has decreased by 7%, resulting from a high decrease on *FAH* (18%) and an increase on *FAFH* of 24%, Table 4.1.

FAH accounted for 75% of food expenditure in 1990 and for 66% in 2000. Therefore one can conclude that Portuguese households spending behaviour are going through some changes: food as a necessity and expenditure on basic goods seems to be getting smaller. The rise of net income level might constitute a stimulus for consumers to turn to other goods, making path to other important components of life.

Table 4.1: *Food expenditure of Portuguese household.*

Component	***1990*** (€)	***1995*** (€)	***2000*** (€)
Food expenditure	***4047***	***3859***	***3745***
Food at home (FAH)	***3026***	***2691***	***2478***
Meat	958	810	716
Fish	461	423	436
Milk, cheese and eggs	358	326	317
Fruits	232	204	194
Vegetables	285	264	237
Other food products	732	665	578
Food away from home (FAFH)	***1021***	***1168***	***1267***
Restaurants and Cafés	942	1027	1136
Canteens	81	140	132

FAFH, once languished and thought to be a luxury, is increasing its share in total food spending, from 25% in 1990 to 34% in 2000. This trend is in accordance with what has been happening in Europe (Gracia & Albisu, 2001; Meulenberg & Viaene, 1998; Mihalopoulos

[4]It should be mentioned that expenditure on drinks is not included in *FAH*. Therefore some reserve should be taken in the analysis since expenditure on *FAFH* includes that item.

[5]Other food products include: cereals and products based on cereals; oils and fats; sugar and other food products. Further separation of the food groups was undertaken when necessary.

[6]Total excluding housing for Continent.

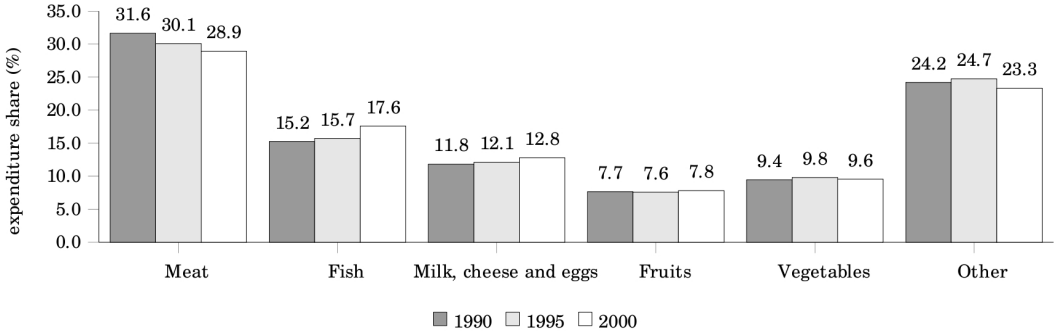
[7]It should be noticed that for the samples used, between 1990 and 2000, real net income increased by 38% (INE, 2002b).

& Demoussis, 2001; Manrique & Jensen, 1998), as previously mentioned in Section 4.2.

Breakdown of *FAH* in different food groups shows that meat, fish and other products, account for the higher proportion of households' food expenditure. The weight of the fish group is not surprising. Portugal is the EU member state with the highest consumption of fish, as pointed out by Banović *et al.* (2004), Chapter 5, and Barreira and Duarte (1997). Concerning the period 1990-2000, meat expenditure in real terms, had the highest decline (-25%) and fish the lowest (-5%), Figure 4.1.

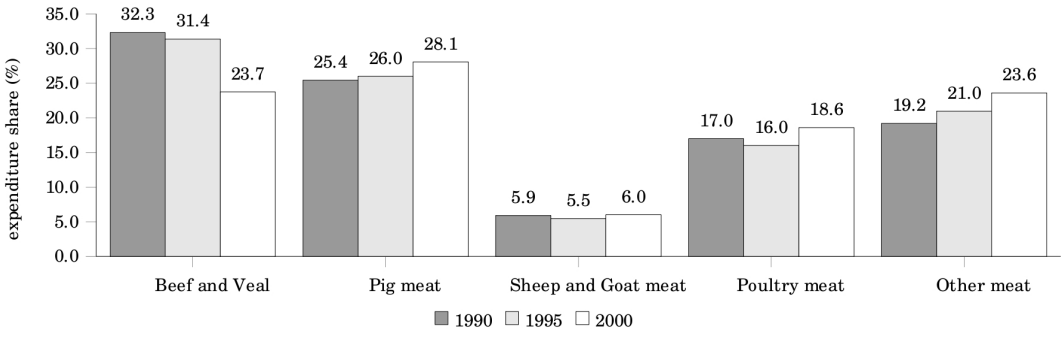
In Figure 4.1, the shares of the food groups in *FAH* expenditure are shown. A closer look to the fish group shows that its share has been increasing (15% in 1990 to 18% in 2000). This slight increase in fish share might be filing the place left by meat (share of 32% in 1990 and 29% in 2000). Barreira and Duarte (1997) have shown that fish is a substitute for the meat group. Another group that has also increased its share is milk, cheese and eggs.

Figure 4.1: *Share of food groups in FAH expenditure in Portugal.*



It is worth mentioning what has happened with the different types of meat included in the meat group[8]. All meat groups increased their shares in meat expenditure apart from beef and veal, particularly between 1995 and 2000, from 31% to 24%, respectively, Figure 4.2. This can be explained not only by the price effect but also by the health concerns due to the *BSE* crisis that took place in 1996, as confirmed by Barreira and Vicente (2001).

Figure 4.2: *Share of different types of meat in meat expenditure in Portugal.*



On average, Portuguese households spent, in 2000, 28% of their total meat spending on pig

[8]Other meat includes: sausages, dried, salted or smoked meat and derivatives, conserves and other fresh, chilled and frozen meats.

meat, 24% on beef and veal, 19% on poultry, 6% on sheep and goat, and 24% on other meat.

These changing patterns that took place in Portugal, for the period under analysis, are in accordance with the studies covered in the literature review, following the general tendency across Europe towards food away from home. According to Gracia and Albisu (2001) food consumption in the European Union can be outlined as follows: (i) a decrease in the proportion of food expenditure; (ii) total food consumption (in quantity terms) at the maximum level; (iii) shift in the food consumption structure, and (iv) an increase in the proportion of expenditure allocated to *FAFH*.

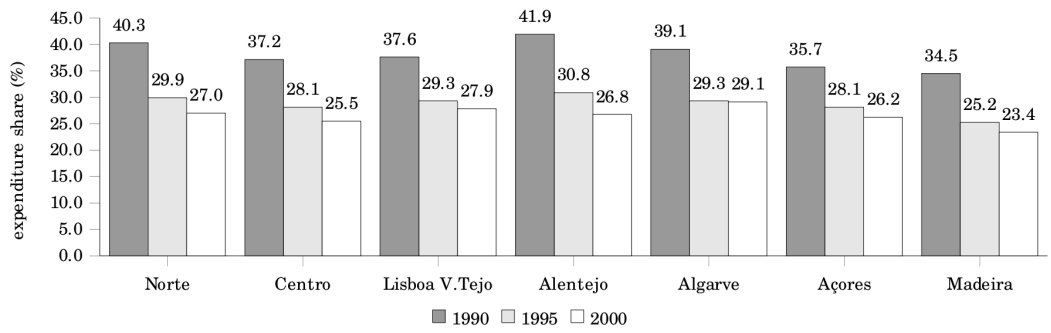
In the following, Section 4.4, an attempt is made to explain these changes based on different variables that were available for the data used: regional location of the household, income level, age and literacy level of the head of the household.

4.4 Socio-economics and demographics and food expenditures

4.4.1 Regional patterns

Regional location of the household may influence food expenditure (see Section 4.2). Portuguese regions represent one pattern of different characteristics. Whilst in 1990, share of food in total expenditure showed some differences across regions (*Alentejo* with the highest share), in 2000 these differences were less clear, Figure 4.3.

Figure 4.3: *Share of food in total expenditure by region in Portugal.*



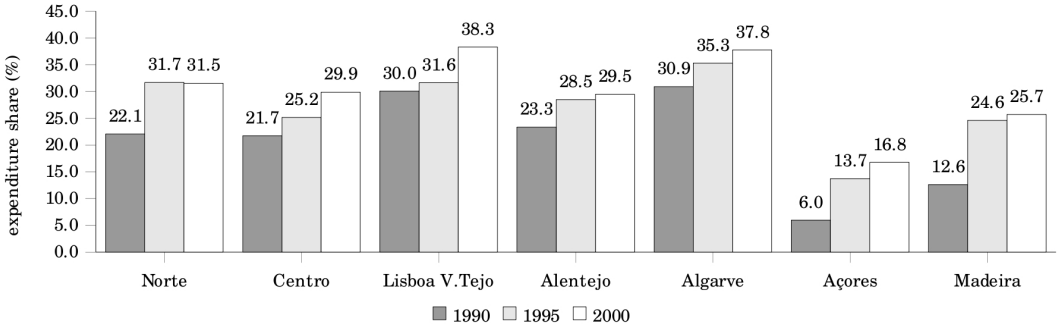
As shown in Figure 4.4, the share of *FAFH* in food expenditure, is higher for the more developed regions, *Lisboa V. Tejo*[9] and *Algarve*, and substantially lower for the two outermost Portuguese regions, *Açores* and *Madeira*, as expected.

Though the figures in which is based the analysis per food groups are not included in the text, some results are mentioned whenever considered relevant. Hence, the analysis of the shares per food groups by region shows that in 2000, meat expenditure was slightly higher in *Norte* and *Centro*, and fish expenditure in *Algarve* and *Lisboa V. Tejo*.

Concerning beef and veal and for the same year (2000), worth mentioning that households in the region of *Norte* affect 30% of their total meat spending on beef, while those from *Alentejo* affect only 7%. This difference can be explained by the quantities consumed and also by the price of meat, since in the region of *Norte*, veal is consumed in greater quantities than beef,

[9]Lisboa e Vale do Tejo.

Figure 4.4: *Share of FAFH in food expenditure by region in Portugal.*



while the opposite occurs in households of *Alentejo*, with veal in general having a higher price than beef. Worth pointing out here that households in the region of *Lisboa V. Tejo*, like those from *Norte*, award higher share of their total meat spendings on beef (36% in 1990, 35% in 1995, and 23% in 2000).

The main point to be retained is that although food expenditure share tends to be similar within Portugal, when it is disaggregated in its two components, *FAFH* and *FAH*, and this last one divided per food groups, there are regional differences (in lifestyle, values, taste, preferences, information, etc.) that clearly influence food consumption patterns, confirming the findings of Manrique and Jensen (1998), and Byrne, Capps and Saha (1998).

4.4.2 Food expenditure and level of income

Share for food in total expenditure has been decreasing with the level of income, accounting, in 2000, for 38% in those households with the lowest level of income, and 24% in households with the highest level of income.

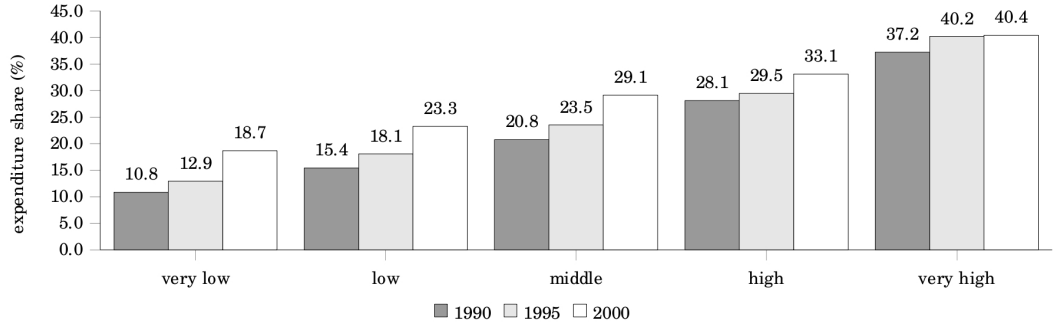
For all income levels, share of food on total expenditure has been declining throughout the times. If we consider the middle income class, we can see that this share was 41% in 1990, decreasing to 30% in 2000. It should be highlighted that the decline is more accentuated in the lower income levels. This might indicate a slight tendency towards similarity between income classes.

Higher participation of women in the labour market implies a higher income level of the household as well as a higher opportunity cost of time, which is in accordance with what has been mentioned in the literature review. In what concerns *FAFH*, its share increases as the level of income increases, Figure 4.5. Besides, in the period covered, higher increases have taken place in the lower income levels.

The share of meat in *FAH* expenditure was, in 2000, higher for *high* and *very high* income levels (both 30% in 2000), while share for fish was slightly higher for the *very high* income levels (19% in 2000). Worth mentioning is that though the share for meat products increases as income increases[10], share for vegetables decreases. Ritson (1988) argues that with higher incomes consumers tend to substitute staple foodstuffs (such as bread, potatoes and rice) switching to higher quality (and higher priced) varieties within the broad food groups (meat, fish, fruit and vegetables). We would then probably expect an increasing proportion of vegetables spending

[10]This is particularly true for beef and veal and it's share in total household meat spendings.

Figure 4.5: *Share of FAFH in food expenditure by level of net income in Portugal.*



as income rises, nevertheless, it should be bear in mind that the group of vegetables includes potatoes and cabbages, which are very important in the Portuguese diet.

In the light of the above mentioned results, one can argue that whilst fish has a generalised level of consumption, the meat and the vegetables groups are affected by the level of income. Therefore income is still highly significant in Portuguese consumption patterns as confirmed by Barreira and Duarte (1997).

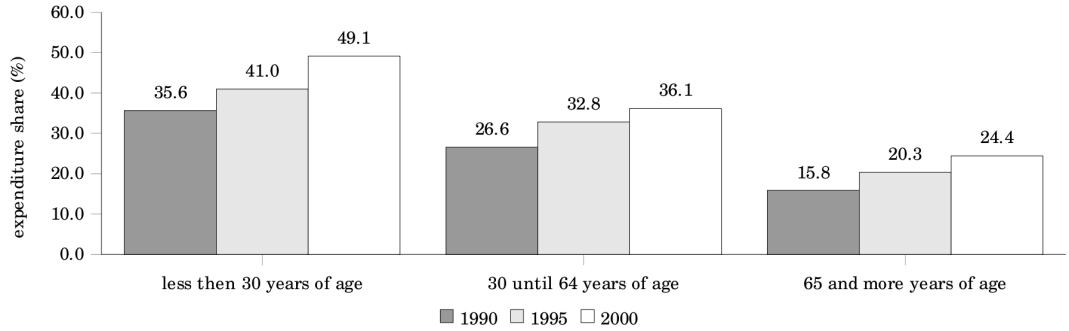
4.4.3 Food expenditure and age

The variable *age group of the head of the household* is important, as it gives an idea of the average age of the remaining household members, and also of its composition. The age group 30-64 is linked to bigger households and with a higher heterogeneity in terms of its members' age. As we do not have information on household composition, the age group will be used in the analysis.

According to the different age group of the head of the household, food spending, in proportionate terms, is higher for those ageing 65 and over, though experiencing the highest decline (43% in 1990 to 30% in 2000).

Younger households tend to eat more away from home as confirmed by the proportion of their spending on *FAFH*, Figure 4.6.

Figure 4.6: *Share of FAFH in food expenditure by age in Portugal.*



During the period under analysis, households ageing 65 and over tended to have higher shares of *FAH* spending on fish, fruits and vegetables, but lower share on meat and milk.

Confirming other studies mentioned in the literature review, such as Gracia and Albisu (2001), Blisard *et al.* (2002), Nayga and Capps (1995), and Nayga (1995).

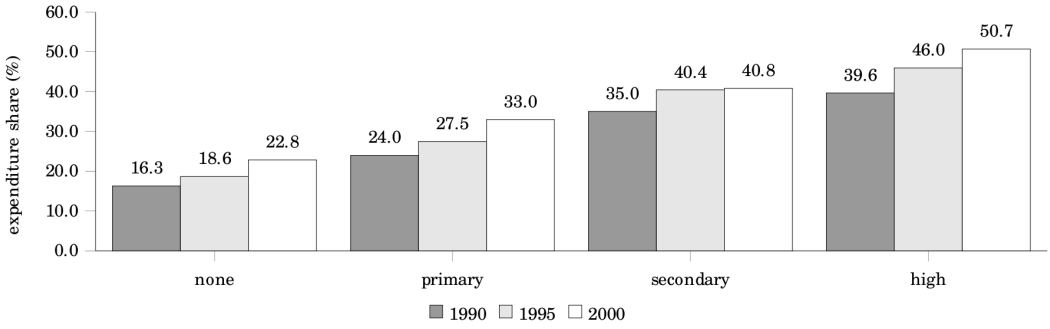
Hence, consumption patterns in Portugal seem to be influenced by composition of the household and age of its members.

4.4.4 Food expenditure and level of literacy

Regarding food spending by different literacy level of the household head, share of food in total expenditure decreases as the level of literacy increases (in 2000 households with the lowest literacy level had 34% and households with the highest literacy level had 19%). For the decade under analysis, the highest decline, in real terms, was in those households with the lower literacy level (no studies). These results are not surprising as the level of literacy should be highly related with the net income level and age of the head of the household.

Considering *FAFH*, its share increased significantly with the literacy level as expected, Figure 4.7. This confirms other research results, though some argue that there is no significant relationship between *FAFH* and literacy level (see Section 4.2).

Figure 4.7: *Share of FAFH in food expenditure by literacy level in Portugal.*



Analysis of different food groups shows that the share of milk, cheese and eggs, is higher for households with higher literacy levels. The same behaviour is reached when analysing expenditure patterns based on age level. On the other hand, share for vegetables declines with the literacy level, probably due to the same reasons given in Section 4.2, as a similar behaviour was found when basing the analysis on income level.

4.5 Conclusion

The objective of this work was to examine and to evaluate food expenditure trends in Portuguese households, taking into account socio-economic and demographic factors, affecting the level of spending on both *FAH* and *FAFH*.

Food expenditure of the Portuguese households in real values, concerning the decade 1990-2000, has decreased and its share in total household expenditure has significantly decreased. In 2000, this share was lower, the higher the income level of the household, the higher the literacy level and the lower the age of the head of the household. Throughout the period covered, these differences tend to be less pronounced. During this decade, *FAH* decreased while *FAFH* has increased substantially. The analysis of food expenditure according to different variables

characterising the households, confirms that the higher share of *FAFH* occurs in households located in more developed regions, with higher income and literacy levels, and with lower age of the head of the household. Throughout the decade the differences found on *FAFH* share by income level have become less evident but more accentuated when considering the age of the household head.

Considering the different food groups it should be mentioned that the meat group declined its share in *FAH* spending while fish and milk, cheese and eggs group, have increased their shares.

Overall, it seems that different consumption patterns can be identified when looking at the different food groups per variable; namely, regional differences which are highly related with the respective consumption habits, and age differences which are related with different needs and health issues. So, further research should be undertaken in order to have a clear view on what actually influence Portuguese household spending behaviour. This requires the use of a disaggregated data base, on individual household level.

In conclusion, Portuguese households appear to start favouring food away from home and leisurely eating-out occasions, so further research on food expenditure may also be undertaken in depth between the *FAFH* and prepared food as well as in terms of meal-type and type of eating facility.

This chapter presents an analysis, based on quantitative data, comparing meat consumption in the different countries of the European Union (EU). Besides this, a reflection is done on the main meat consumption determinants. This analysis allows some qualitative hypothesis about a different number of issues, which will raise some questions for further research.

5

Are EU consumers changing meat consumption habits? An analysis for the last decade[1]

5.1 Introduction

Consumers in developed countries demand high quality food products and are particularly concerned with the impact on health, nutrition, and safety of the food that they eat (Swinbank, 1993; Kinsey, 1993). Nevertheless, though tastes and preferences influence changes in patterns of food consumption, prices and incomes still have an important role in determining consumer decisions.

Reading through the literature we can easily see that research has been going around the decline in demand for beef relative to other meats (Santos, Nicolau & Aguiar, 2000; Barreira & Vicente, 2001). This decline can be attributable to several factors, namely the relative prices of other meats, the changing habits of consumers and the overall lack of confidence towards beef after the *BSE* and other crisis.

This obliges that all those enrolled in the meat chain, and particularly in beef chain, concentrate their efforts to look upon ways to improve their market competitiveness and regain consumer confidence towards beef. Producers use the tools they have available, namely traceability, marketing of *PDO* products, organic products, amongst others; within the European Union (EU), governments develop policies to address these problems, namely the introduction

[1]This chapter has been published as: Banović, M., Barreira, M.M., Jorge, R., Lemos, J.P.C., Fraústo da Silva, M. & Aguiar Fontes, M. (2004). Are EU consumers changing meat consumption habits? An analysis for the last decade. In APDEA (Ed.), *Os desafios e oportunidades no sector agrícola e alimentar em Portugal, Proceedings of the IV Congresso Nacional de Economistas Agrícolas* (pp. 33-35), Faro, Portugal. [The whole article available at: `http://www.apdea.pt/4congresso/`]

The present chapter has also been submitted to be published as a chapter of the book, edited by APDEA - Associação Portuguesa de Economia Agrária, *Os desafios e oportunidades no sector agrícola e alimentar em Portugal*, as Banović, M., Barreira, M.M., Jorge, R., Lemos, J.P.C., Fraústo da Silva, M. & Aguiar Fontes, M. Are EU consumers changing meat consumption habits? An analysis for the last decade.

of beef labelling and traceability of food products.

Facing these efforts, is the consumer regaining confidence? Is it translated in *per capita* meat consumption across the EU? To help market players to improve their competitiveness in today's global market, it is a major requirement the understanding of consumer behaviour towards meat.

The main objective of this presentation is to summarise some of the available data concerning meat and fish consumption in the EU and to undertake a brief literature review on what have been considered as major determinants of meat consumption.

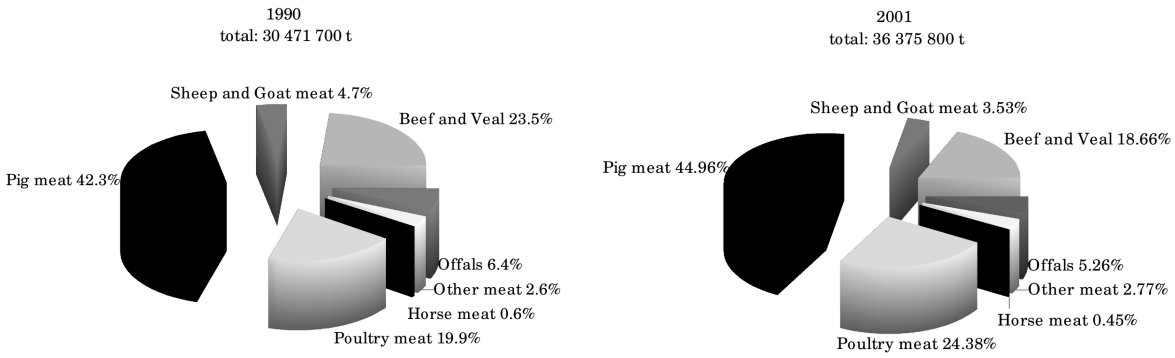
This analysis allows some qualitative hypothesis about a different number of issues, which will raise some questions for further research.

5.2 Meat consumption

The EU is an important pool of tastes, culture, habits, concerns, and ethical issues, amongst others. These different characteristics shape each country preferences, habits and food consumption patterns. Consumers' behaviour dictates these country preferences, as they are the ones who have the final word. It appears that consumers never had so much food choice, and their awareness of healthy and quality food has evolved rapidly. However, the recent events in the meat sector influence considerably consumers' choice concerning meat (Gracia & Albisu, 2001; Frewer, Risvik & Schifferstein, 2001).

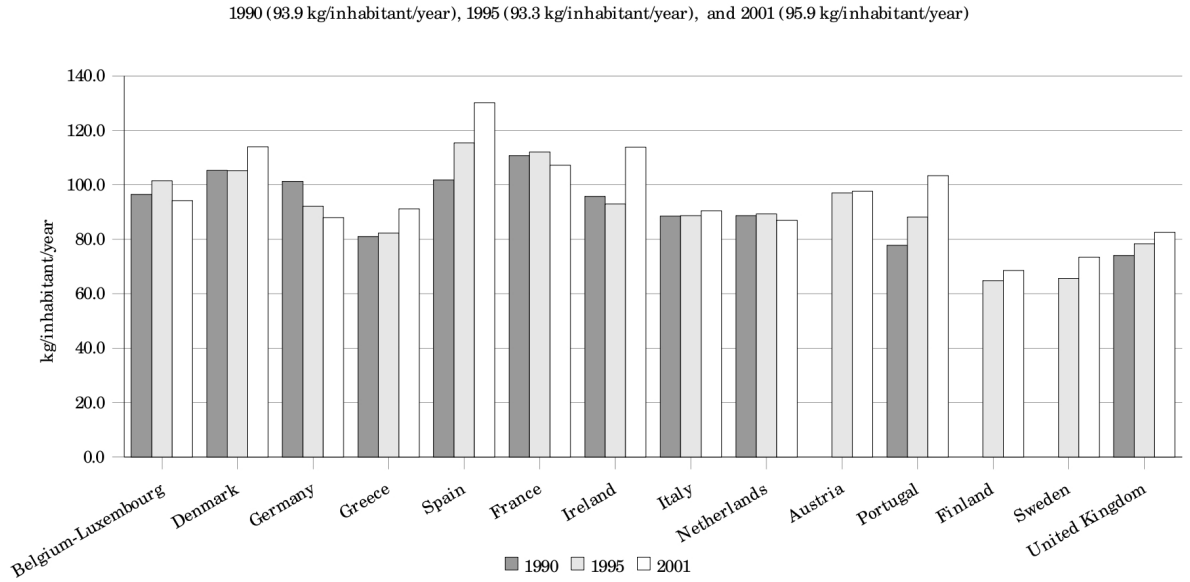
For the last decade, and based on gross human and *per capita* consumption, pig meat has been the most consumed meat in the EU. In 2001, pig meat accounted for 45% of total meat consumption, followed by poultry meat (24%) and beef and veal (19%), Figure 5.1. In 1990, pig meat (42%) was followed by beef and veal (23%) and then poultry meat (20%). This is an interesting feature as it took place in a short period of time.

Figure 5.1: *Gross human consumption of meat in the EU: EUROSTAT (2004a).*



From 1990 to 2001, *per capita* meat consumption in the EU increased by around 2%, Figure 5.2. This increase was mainly attributed to the increase in poultry and pork. Increase in total meat *per capita* consumption did not follow the same magnitude, as the increase in the two above-mentioned meats was mainly due to the decrease in beef and veal *per capita* consumption. Gracia and Albisu (2001) also report an increase in poultry and pig meat consumption for the period 1991-1996. However, these authors report a decrease of 2% in average fresh meat consumption in the EU between 1991 and 1996, attributing this decrease to *BSE*.

Figure 5.2: *Per capita total meat consumption by EU member state: EUROSTAT (2004a).*



Within the EU, Spain, Denmark, France and Ireland are characterised by having the highest values of total meat *per capita* consumption. On the other hand, Finland, Sweden and the United Kingdom, have the lowest ones, Figure 5.2, which might be explained by a diet with other sources of animal protein.

In 2001 Portugal's *per capita* consumption of total meat was 103 kg and meat consumption accounted for 28.9% of total food products expenditure in 2000. In 1990 and 1995 the proportion was, respectively, 31.6% and 30.1% of total food products expenditure (INE, 1999). It should be mentioned the high level of *per capita* consumption of fish in Portugal (average of 61 kg/inhabitant/year in 1999 considering all fish), a main component of Portuguese diet. Portugal is the EU member state with the highest level of *per capita* fish consumption (EUROSTAT, 2004b).

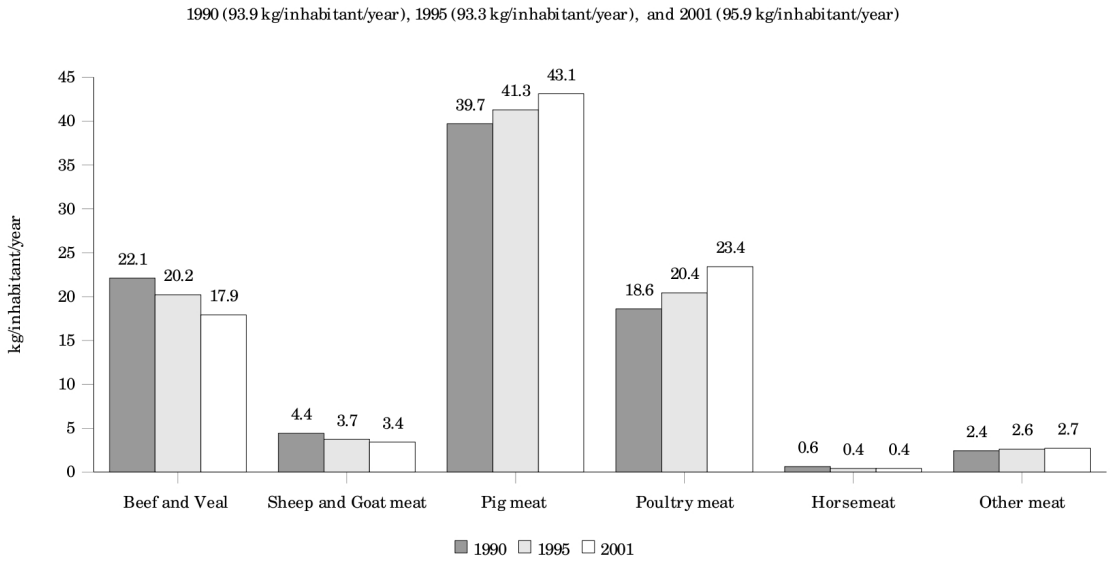
During the period 1990-2001, Portugal was the country with the highest increase in *per capita* meat consumption (32.9%), followed by Spain (27.8%) and Ireland (18.8%). The countries, which have experienced a decrease in their levels of *per capita* meat consumption, were Germany (-13.1%), France (-3.2%), Belgium-Luxembourg (-2.4%) and Netherlands (-2.0%). The increase in Portugal during this decade can be, in part, attributable to the fact that the average levels of meat protein intake were below the average of the remaining EU countries. The higher purchasing power, the decline in real meat prices and the decrease in fish consumption associated with an increase in its relative price (Barreira & Vicente, 2001), are key explaining factors. These, coupled with the expansion we have assisted in the distribution channels of food products and in the meat chain, have all contributed to the increase in *per capita* meat consumption in Portugal. For the last five years (1997-2001) Portuguese average *per capita* consumption of total meat has been above EU average.

Dividing the decade in two periods, 1990-1995 and 1995-2001, mainly due to the accession at a later stage of countries such as Finland, Sweden and Austria (accession started in 1995), we can see that in the first period EU *per capita* meat consumption remained basically the

same, though Gracia and Albisu (2001) report a decrease of 0.6%, whilst in the second period it increased by 2%. Germany and Ireland had the highest decrease in the first period (-9.1% and -3.0%, respectively) whilst Belgium-Luxembourg (-7.2%), Germany and France (-4.4%) had the highest decrease in the second period. It is worth mentioning, that Portugal and Spain had the highest increase in the first period (13.1%) and Ireland in the second period (22.5%).

Considering meat consumption per type of meat, for the last decade, per capita consumption of beef and veal in the EU decreased by 19.0%, and that of sheep and goat by 22.7%, whilst consumption of poultry and pork have increased by, respectively, 25.8% and 8.6%. Pig meat is clearly the most consumed meat, Figure 5.3.

Figure 5.3: *Per capita consumption by type of meat in the EU: EUROSTAT (2004a).*



Consumers' food choice is influenced by several factors and efforts should be developed in order to understand these factors, so that one can counteract the decline in consumption of particular types of meat. As consumer demand towards food, particularly meat is mainly dominated by safety concerns, market players must all work in order to ensure that meat arriving at the supermarket shelves or at the butcher satisfies consumer requirements in terms of safety attributes (and other required). It is possible to say that the EU is self-sufficient in total meat; the country with highest self-sufficiency degree in total meat is Denmark, followed by Ireland and Netherlands whilst Greece, Portugal and UK have the lowest ones, Figure 5.4.

Concerning different types of meat, EU has higher self-sufficiency ratios in pig meat, poultry meat and beef and veal. The EU is not self-sufficient in sheep and goat meat, horsemeat and other meat, Table 5.1.

When analysing Portuguese imports and exports of the different types of meats, Portugal has a negative net trade for all types of meats, and particularly significant for beef and veal and for pig meat. It is interesting to notice that imports of beef and veal in quantitative terms have increased at an annual growth rate (a.g.r.) of approximately 6% between 1991 and 2000, whilst between 1996 and 2000 this rate was approximately 18%. On the other hand, in terms of exports these have decreased at an a.g.r. of 41% during the period 1996-2000, whilst for the

whole period the a.g.r. was approximately -6%. This should be related with the embargo that has been imposed on Portuguese exports in 1998 after the *BSE* cases that have been diagnosed in Portugal. However this embargo was lifted on 21 of September 2004, which will probably change the tendency in the future.

Figure 5.4: *Self-sufficiency in total meat by EU member state: EUROSTAT (2004a).*

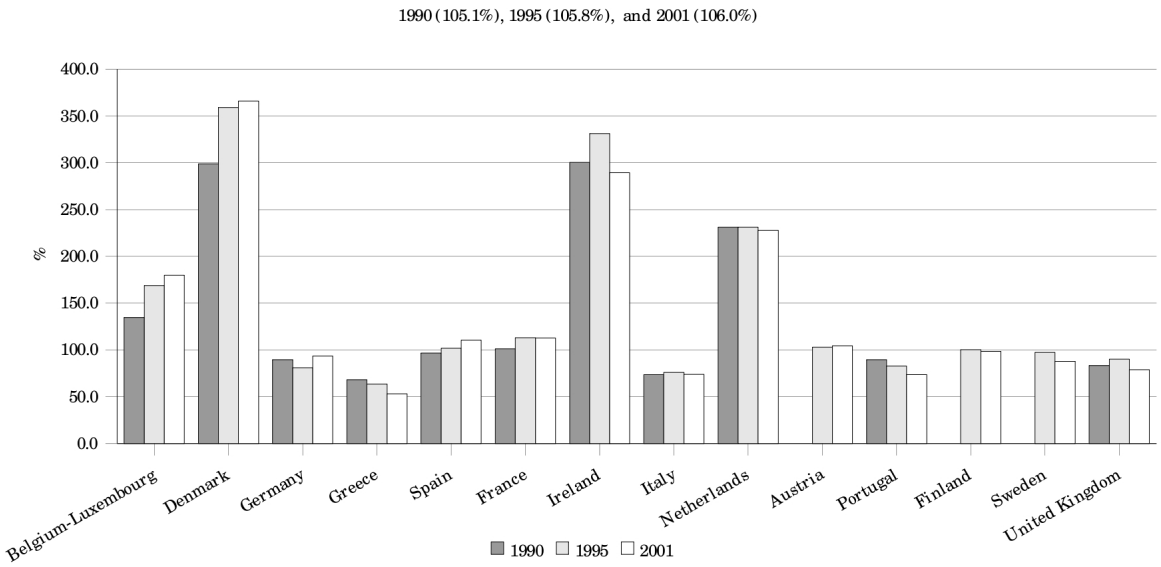


Table 5.1: *EU self-sufficiency ratios for meat*[a]*: EUROSTAT (2004a).*

	1991	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*Mean*
Total meat	105.1	103.9	105.0	105.1	105.8	106.9	107.7	107.2	106.8	105.9	106.0	105.9
Beef&Veal	115.0	112.6	106.4	105.7	109.5	116.0	112.1	105.3	103.3	103.9	109.1	109.0
Pig meat	103.9	103.0	106.1	106.9	105.7	105.6	107.3	108.8	110.3	108.5	107.3	106.7
Sheep&Goat	84.9	82.5	87.7	83.8	84.2	82.2	81.7	82.3	82.6	80.6	79.1	82.9
Horsemeat	24.6	26.2	27.8	30.1	33.2	28.7	30.9	31.6	31.5	39.2	34.1	30.7
Other meat	92.6	93.9	93.7	94.1	92.6	94.3	97.1	93.4	92.1	94.9	92.4	93.7

[a] In %.

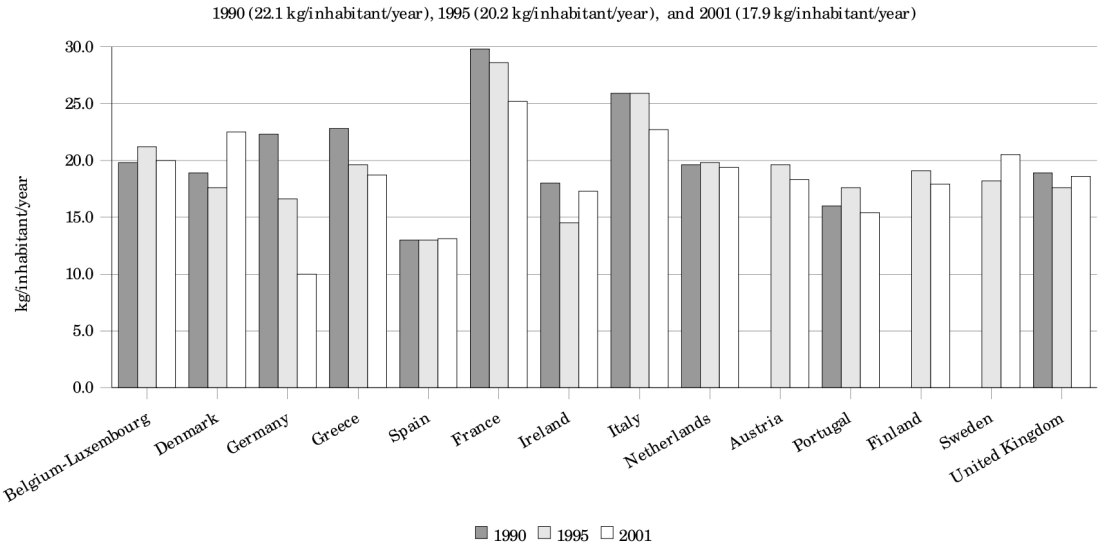
5.3 Consumption of beef and veal

In the last decade we have assisted to several problems that have affected the meat sector, and particularly the beef sector. These problems relate mainly to the *Bovine Spongiform Encephalopathy* (*BSE*) crisis and *foot and mouth disease*, which have prompted huge concerns in the consumer demand for beef. In United Kingdom, *BSE* was first observed in April 1984, diagnosed in 1986 and it peaked in 1992-93 (DEFRA, 2004).

Between 1989 and 2003 more cases of *BSE* had been identified in Belgium, Denmark, France, Ireland, Netherlands, Portugal and, more recently, in Germany, Spain and Italy. From 1995 up to early December 2000, 124 human cases of the new variant *Creutzfeldt-Jakob disease* (*CJD*) had been reported in the UK, 3 in France and 1 in Ireland (CDC, 2004). All this implied some concerns and changes in consumer behaviour, which turned consumers, within the meat group, to other options.

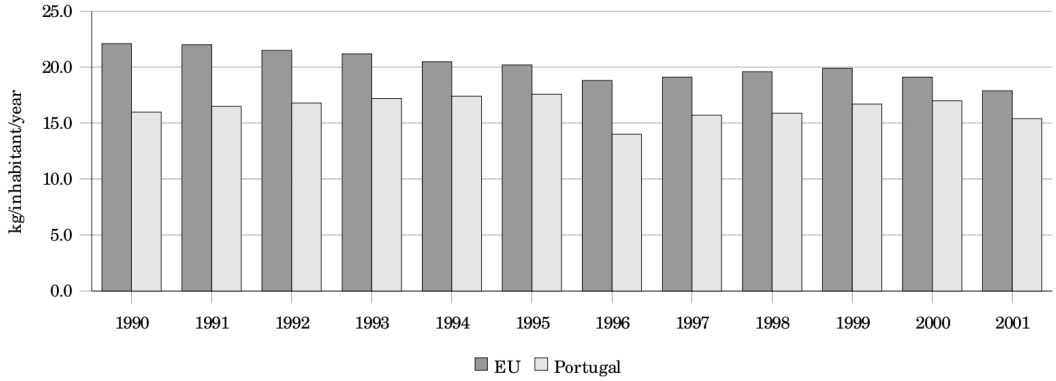
Beef and veal *per capita* consumption in the EU was 22.1 kg/inhabitant/year in 1990, 20.2 kg in 1995 and 17.9 kg in 2001. Within the EU, France and Italy have been the countries with the highest *per capita* consumption of beef and veal. In the last years of this decade, Denmark also joined this group, Figure 5.5. Amongst the countries with the lowest *per capita* consumption of beef and veal are Spain and Portugal, joined recently by Germany.

Figure 5.5: *Per capita beef and veal consumption by EU member state: EUROSTAT (2004a).*



Beef and veal *per capita* consumption in Portugal has been always below EU average during the period 1990-2001, Figure 5.6. It is worth mentioning that in 1996, Portugal had a higher proportional decrease in beef and veal *per capita* consumption than the decrease that took place in the EU as a whole.

Figure 5.6: *Per capita beef and veal consumption in the EU and Portugal: EUROSTAT (2004a).*



The negative trend we have assisted in beef and veal *per capita* consumption can be associated with consumer concerns in terms of safety, health, animal welfare and environmental issues, as well as with changing consumer lifestyles and with the higher demand for convenience.

Considering again 1990-2001 decade separated in two sub-periods, it is possible to conclude that beef and veal *per capita* consumption in the EU decreased by 8.6% from 1990 to 1995. This

negative change was mainly attributed to the decrease in Germany (-25.6%), Ireland (-19.4%) and Greece (-14.0%). Portugal increased its beef and veal *per capita* consumption in this period (10.0%). The decline in beef and veal consumption in the EU was more accentuated between 1995 and 2001 (-11.4%). Germany (-39.8%), Portugal (-12.5%) and Italy (12.4%), were the member states with the highest declines in *per capita* consumption of beef and veal. On the other hand, and in this same period, Denmark (27.8%), Ireland (19.3%) and Sweden (12.6%) increased their *per capita* consumption of beef and veal.

In order to react to the *BSE* crisis and trying to prevent potentially *BSE-infected tissues* from entering the human food chain, European countries have instituted a variety of control measures and some legislation has been put forward[2], which requires, amongst other things, that all food products should be able to be traced (from January 2005). Also, a surveillance program on *BSE* started in 2001 by EU Commission, trying to increase safety of beef and to provide a reliable insight into prevalence and evolution on *BSE* in the EU 15 (Appendix 5.5). All this provides solid bases for the future determination of policies that attempt to protect animals and consumers' health, having, as ultimate goal, to restore consumers' confidence towards beef.

It is worth to mention that, after the *BSE* crisis, aggregate consumption of beef was lower for the majority of the member states than for the period prior to the scare (Henson & Northern, 2000). Average *per capita* consumption of beef and veal was calculated for two periods[3]: 1990-1995 and 1995-2001; as these periods were considered to include changes in consumption related with *BSE* crisis, Table 5.2.

As seen as from Table 5.2, Denmark, Sweden and Spain, are the only EU member states experiencing an increase in beef consumption from the period: 1990-1995 to 1995-2001. Although Sweden is the unique member state reported as exempt from *BSE* in the period considered, Spain and Denmark[4] were only identified in 2000 and 2001, respectively.

Table 5.2: *Beef and veal per capita consumption.*

	Average per capita consumption		***Variation***
	1990-1995	***1995-2001***	***(%)***
Belgium-Luxembourg	20.8	20.2	-2.7
Denmark	19.3	20.8	8.0
Germany	19.4	14.4	-25.7
Greece	21.3	19.9	-6.6
Spain	13.2	14.3	8.4
France	29.1	26.8	-7.7
Ireland	16.5	16.4	-1.1
Italy	25.9	24.4	-5.6
Netherlands	20.4	18.9	-7.1
Austria	20.4	19.3	-5.5
Portugal	16.9	16.0	-5.2
Finland	19.4	19.0	-2.1
Sweden	18.2	19.9	9.2
United Kingdom	18.5	16.8	-9.4
EU	21.3	19.2	-9.5

The previously mentioned surveillance on *BSE* confirmed (among 10,041,295 tested cattle), in year 2003, 1,364 animals positive for *Transmissible Spongiform Encephalopathy* (*TSE*), which was 36% less than the previous year. Positive animals were found in all EU countries, except Sweden. Austria, Greece, and Finland were only reported as having positive cases in 2001, Appendix 5.5.

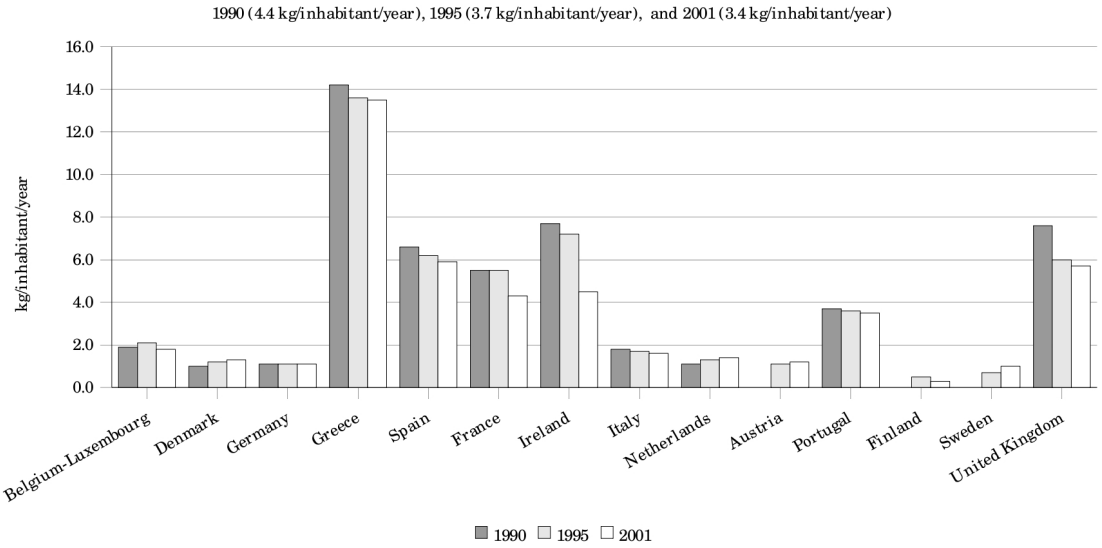
[2]Such as the Reg. (CE) N 1760/2000 on beef labelling and the EU Food Law, Reg (CE) N 178/2002.
[3]Based on the data from EUROSTAT (2004a).
[4]Denmark had an imported case in 1992.

5.4 Consumption of sheep and goat meat

Amongst the different types of meat consumed and excluding horse meat, sheep and goat meat have experienced the biggest decline in *per capita* consumption during the period 1990-2001 (-22.7% EU average). This decline took place essentially between 1990 and 1995, since from 1995 up to 2000, and for the EU as a whole, *per capita* consumption of sheep and goat meat remained unchanged and stabilised at 3.7 kg/inhabitant/year, although in 2001 it decreased to 3.4 kg/inhabitant/year.

Within the EU, the Greeks are the biggest consumers of this type of meat, with an average *per capita* consumption well above the remaining member states (13.5 kg/inhabitant/year, 2001), which might be explained by cultural factors. Ireland, UK, Spain and France come next, all of them also with *per capita* consumption above the EU average, Figure 5.7.

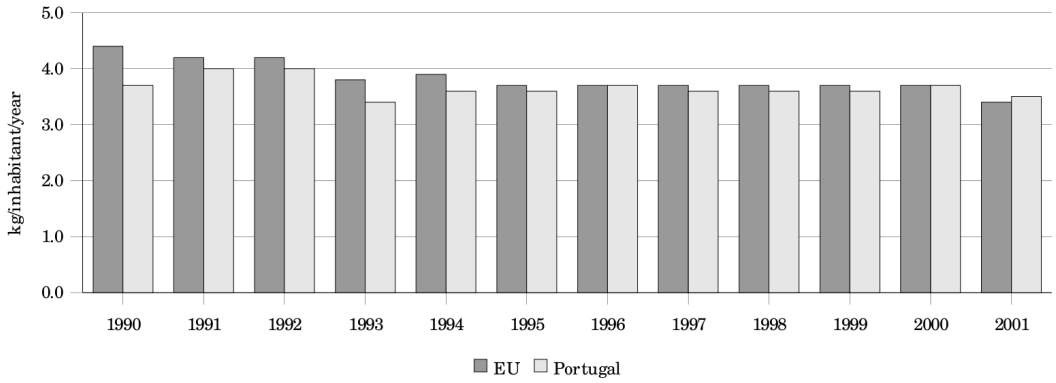
Figure 5.7: *Per capita sheep and goat meat consumption by EU member state: EUROSTAT (2004a).*



It should be mentioned that all member states with the highest values of per capita consumption are characterised by a decrease in their levels of consumption of sheep and goat during the period 1990-2001. This decrease was particularly high in Ireland (-41.6%), UK (-25.0%), France (-21.8%), Italy and Spain (both -11%). Portugal, Greece and Belgium-Luxembourg all experienced a decrease of approximately 5%. The other EU member states are characterised by lower absolute values of *per capita* consumption, noticing that the Finish and the Swedish seem to be not so found or not to have the tradition of consuming this type of meat, since their levels of *per capita* consumption are much lower. Denmark and the Netherlands experienced an increase in their *per capita* consumption of sheep and goat meat from 1990 to 2001 of, respectively, 30.0% and 27.2%. It should be kept in mind that these two countries are in the group of those EU member states with lower levels of *per capita* consumption of this type of meat, Figure 5.7.

Sheep and goat meat *per capita* consumption in Portugal has been below the EU average, though in the last 5 years this difference has shortened and in 2001 it had been above EU average, Figure 5.8.

Figure 5.8: *Per capita sheep and goat meat consumption in the EU and Portugal: EUROSTAT (2004a).*



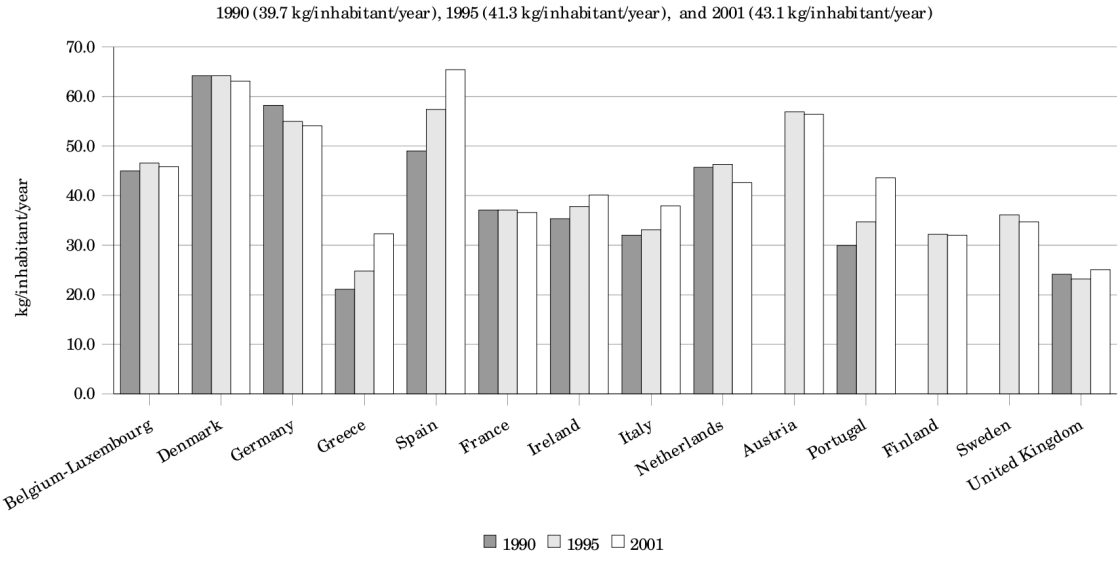
In 2003, the European Commission has also tested sheep and goats for *TSE* (*Transmissible Spongiform Encephalopathy*), confirming that from 488,119 sheep and 63,022 goats tested, 1,787 sheep, and 46 goats were found positive for *scrapie*, Appendix 5.6.

Detection of *scrapie* among sheep and goat can be one of the reasons for the decline of sheep and goat meat consumption in the near future and can contribute for loosing consumers' confidence towards these meats, leaving behind its good attributes often associated with the fact of being leaner.

5.5 Consumption of pig meat

Pig meat has been, for the last decade, the most consumed meat in the EU, accounting for approximately 45% of total meat consumed. In 2001, the EU had a *per capita* consumption of pig meat of 43.1 kg/inhabitant/year, Figure 5.9, and an increase of 8.6% from 1990 to 2001 was registered.

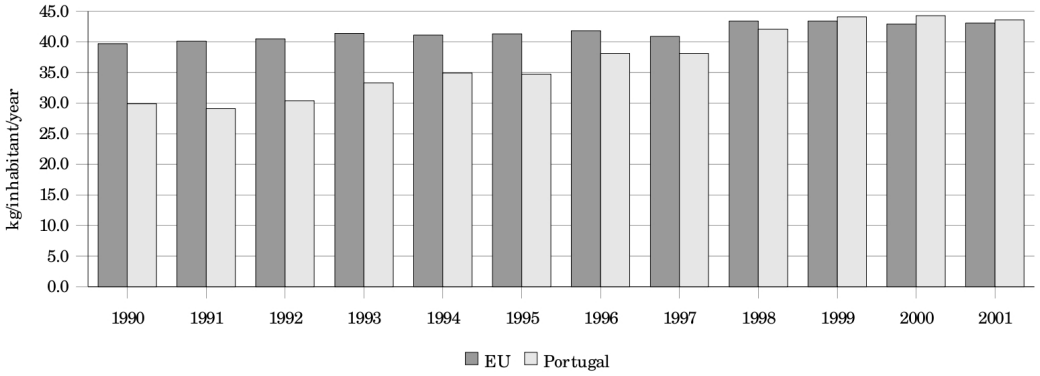
Figure 5.9: *Per capita pig meat consumption by EU member state: EUROSTAT (2004a).*



Breaking period between 1995-2001 in two sub-periods, *per capita* consumption of pig meat increased by 4.0% from 1990 up to 1995 and by 4.4% from 1995 to 2001. The higher increase in the last period might be related with the problems that have been surrounding the beef sector. This increase is mainly attributable to the increase that has taken place in Greece, Portugal and Spain. It is interesting to notice that Greece and the UK are the countries with the lowest levels of *per capita* pig meat consumption.

Pig meat *per capita* consumption in Portugal has always been below EU average, except for the last three years (1999-2001) where it was slightly above, Figure 5.10.

Figure 5.10: *Per capita pig meat consumption in the EU and Portugal: EUROSTAT (2004a).*



The increase in pig meat consumption in the EU might be attributed to several factors. One of the reasons is the substitution that took place, within the meat group, after the *BSE* crisis, with consumers switching to other options than beef. Barreira and Vicente (2001) confirm that changes in pig meat consumption have mainly been due to the *BSE* effect, arguing that *BSE* effect in pig meat consumption has been large enough to outweigh the price and expenditure effects. In the near future one can probably expect a further increase in pig meat consumption.

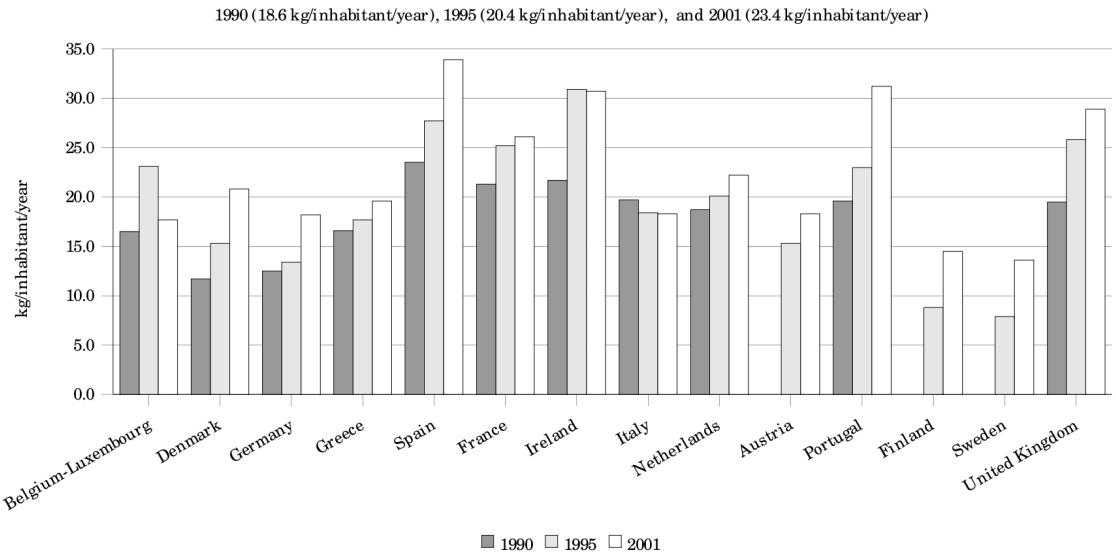
5.6 Consumption of poultry meat

Within the EU, poultry is the meat with the highest relative growth (25.8%) in consumption for the decade 1990-2001. EU consumers seem to be shifting to pig meat and to poultry meat due to several factors. Apart from the crises that have surrounded beef, also health concerns have lead to a higher consumption of poultry meat. In fact, poultry meat is in the group of white meats, often associated with healthier diets, with lower levels of saturated animal fats and cholesterol. These characteristics, associated with price and income effects, might explain the higher increase in per capita consumption of poultry meat. Barreira and Vicente (2001) concluded that in 1996-97 the increase in chicken consumption has been mainly attributed to the price effect (decrease of chicken price relative to prices of turkey and pork) and only slightly to the *BSE* effect. On the other hand, the increase verified in consumption of turkey has been mainly attributed to the *BSE* effect that outweighed the price effect.

Nevertheless, it should be highlighted that at present in Portugal, there might have been a decrease in poultry consumption due to the *nitrofurans* crisis, which hit the Portuguese poultry sector in 2003. Data on *per capita* consumption are not available for more recent years therefore

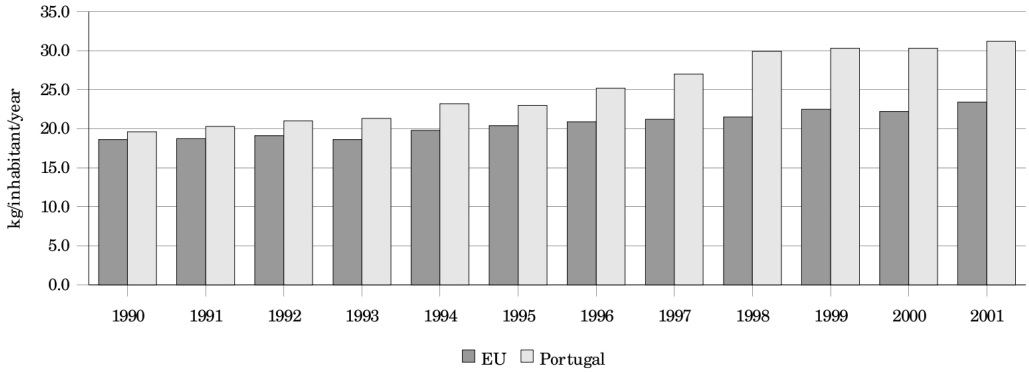
we cannot confirm this a priori hypothesis. Within the EU, the countries with the highest levels of poultry *per capita* consumption are Ireland, Spain, Portugal, United Kingdom, and France, Figure 5.11, all above EU average.

Figure 5.11: *Per capita consumption of poultry meat by EU member state: EUROSTAT (2004a).*



For the last decade, Portugal has in fact been characterised by levels of *per capita* consumption of poultry meat above EU average and this distance has been increasing for the last years, Figure 5.12.

Figure 5.12: *Per capita consumption of poultry meat in the EU and Portugal: EUROSTAT (2004a).*



5.7 Consumption of horsemeat and other meats

Within the EU, horsemeat usually is not included in the daily diet (contributing with 0.4% of total meat consumption in 2001), as there seem to exist no tradition in consuming this type of meat. Levels of *per capita* consumption of horsemeat are well below those of other types of meats and the country where this meat is more common, based on the level of *per capita* consumption, seems to be Belgium-Luxembourg, with a value of 1.3 kg/inhabitant/year in 2001.

However, in 1990, horse meat *per capita* consumption in Belgium-Luxembourg was around 2.9 kg/inhabitant/year, hence a significant decrease (-55.2%) took place.

Other meats include, among others, game meat. Within the EU, other meat per capita consumption increased by 12.5%. EU average *per capita* consumption of other meat was, in 2001, around 2.7 kg/inhabitant/year.

As a final remark on meat consumption in the EU, it is possible to confirm that differences do exist across the EU member states. As an example, per capita consumption of beef and veal is particularly high in France and Italy and, in 2001 Denmark and Sweden joined these two countries, Table 5.3. *Per capita* consumption of poultry is higher in Ireland, Spain, Portugal, United Kingdom and France, and pig meat *per capita* consumption is higher in Spain, Denmark, Austria and Germany. Spain is the EU member state with highest *per capita* consumption of total meat, followed by Denmark, Ireland and France. On the other hand, Finland, Sweden and the United Kingdom are the EU member states with the lowest levels of *per capita* consumption in terms of total meat.

Table 5.3: *Per capita consumption by type of meat in selected EU member states and Portugal*[a].

Total meat		***Beef and Veal***		***Pig meat***		***Poultry meat***		***Sheep and Goat meat***	
Spain:	128	France:	26	Spain:	65	Ireland:	32	Greece:	14
Denmark:	114	Italy:	24	Denmark:	64	Spain:	32	Ireland:	6
Ireland:	112	Denmark:	22	Austria:	59	UK:	29	UK:	6
France:	107	Sweden:	21	Germany:	54	France:	25	Spain:	6
Portugal:	104	***Portugal:***	16	***Portugal:***	44	***Portugal:***	31	***Portugal:***	4

[a]Calculated from EUROSTAT (2004a).

5.8 Consumption of fish

The answer to the question: *Are EU consumers changing meat consumption habits?* cannot be completed if its main substitute: fish, is ignored. Fish constitutes a valuable source of animal proteins and contributes to a healthier diet.

In the period from 1990-1999 (data available), *per capita* fish consumption in the EU has increased by 8.9%. This increase has taken place in the majority of EU countries. Exceptions are Ireland (-9.3%), Finland (-7.9%), Germany (-6.1%), France (-1.3%) and Sweden (-0.4%). Portugal is the member state with the highest *per capita* fish consumption (61.1 kg/inhabitant/year, 1999), Figure 5.13, followed by Spain (44.4 kg/inhabitant/year, 1999), both with values well above EU average (24.5 kg/inhabitant/year, 1999).

Austria and Germany have the lowest *per capita* consumption (11.4 and 12.4 kg/inhabitant/year, 1999). The highest increase in *per capita* fish consumption has taken place in the Netherlands (88.1%), followed by Spain (29.4%) and Austria (25.3%). If breaking this period in two, the higher increase in *per capita* fish consumption in the EU took place from 1995 to 1999 (5.6% against 3.1% in 1990-1995). Fish *per capita* consumption in Portugal has always been above EU average in the period considered, Figure 5.14.

Gracia and Albisu (2001) also report an increase in fish consumption by 6% for the period 1991-1996, arguing that this *was due to the healthy attributes stressed by food specialists and reinforcement of consumer's awareness.*

Figure 5.13: *Per capita consumption of fishery products by EU member state: EUROSTAT (2004a).*

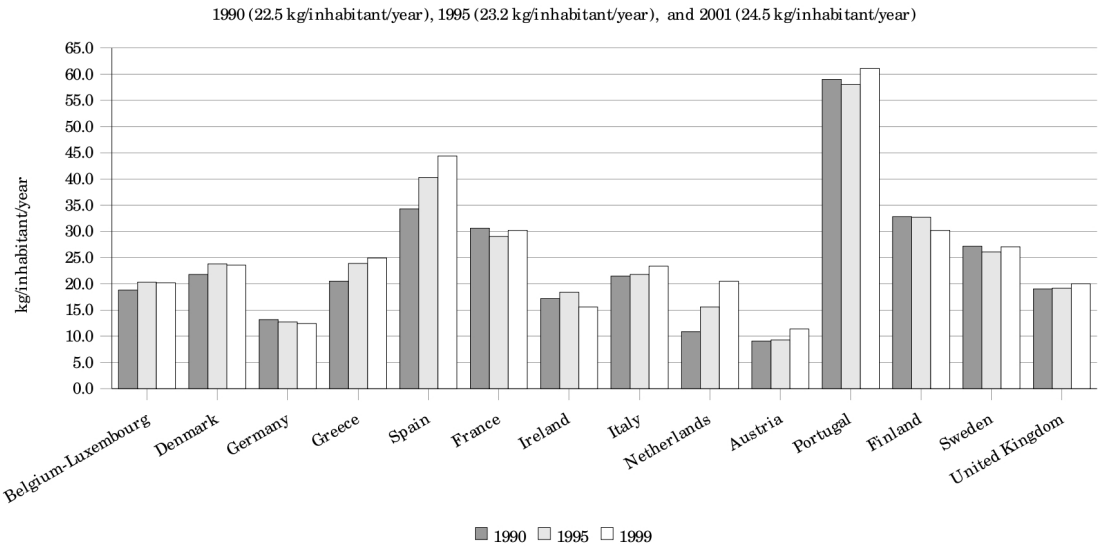
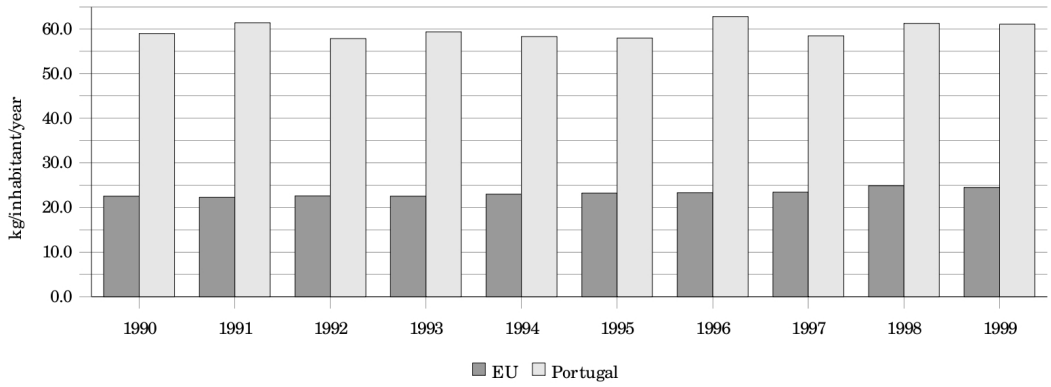


Figure 5.14: *Per capita consumption of fishery products in the EU and Portugal: EUROSTAT (2004a).*



5.9 Factors influencing meat consumption

According to Gracia and Albisu (2001), and as previously pointed out (Section 4.3), consumption of food products in the EU has been mainly characterised by: (i) a change in the food consumption pattern; (ii) consumption away from home; (iii) a certain stagnation of food consumed in quantity terms, and (iv) the decreasing proportion of food expenditure. Increasing opportunity cost of time associated with changing lifestyles has contributed for a higher demand for convenience. The consumption pattern has shifted and in today's global market, food consumption is mainly determined by choice, which implies that big efforts are undertaken in order to attract consumer choice towards a particular food product. But what can influence this choice?

Antle (1999) refers to *old* and *new economics* of agriculture, arguing that *new economics* is involved with the markets for quality-differentiated products, implying that the demand function is not only dependent upon prices, incomes and population, but also on the population characteristics and non-price attributes of the product. These non-price attributes are in fact

quality attributes which, according to the same author *may include nutritional content, safety and convenience characteristics and might also include how the product was produced, the environmental impact of production, and production processes and inputs like pesticides, irradiation and genetically modified organisms.* Barreira and Duarte (1997) showed that prices and incomes have considerably determined beef and fish consumption pattern in Portugal, highlighting the importance of convenience, a quality attribute.

To be competitive in today's global market, global here is in the sense that we can trade any type of product all over the world; the key is the satisfaction of consumer demands, hence satisfying consumer tastes and preferences. Consumption of food, and particularly of meat, is becoming more and more influenced by attitudes, perceptions, and other complex psychological factors. Developed economies demand food that is healthy, tasty, highly convenient, and safe. These requirements are mainly the result of: recent food scares that have prompted considerable concerns in terms of the food we eat; higher purchasing power; particular policies like the *common agricultural policy* (*CAP*); better knowledge on the link between diet and health; the globalisation of markets; the impact of the media and the easier access to information.

Several factors influence consumer behaviour towards food, namely economic and socio-demographic factors, the structure of the distribution sector in each country, amongst others. Considering the economic factors, particularly relevant are prices and incomes. Ritson and Petrovici (2001) state that one of the most common trade-offs that the consumer has to face daily is between price and quality, and one can say that price is normally the barometer of acceptance of the product by the consumer. Higher per capita incomes, which characterise more developed economies, imply a consumer demand for higher quality and safety (Kinsey, 1993; Swinbank, 1993). Henson and Northern (2000) emphasised the importance of understanding cross-national differences between consumers, in order to have a clear picture of the nature of consumer concerns about the safety and quality.

As mentioned by Gracia and Albisu (2001), much debate has been going on the homogeneity or heterogeneity of consumers towards food. Askegaard and Madsen (1995) performed a survey on Europeans behaviour and attitudes towards food, concluding that the most homogeneous countries are Belgium, Portugal, Greece, and Italy, whilst Spain, Ireland, Austria, and Norway are quite heterogeneous. It seems that one can conclude that although facing a global market, it is possible to find different consumption patterns and food product styles. Hence the strategy should be - *be global but act locally.*

Preferences towards different types of meats are highlighted in the levels of *per capita* consumption and this is also influenced by socio-demographic and cultural factors. Considering the ageing of the EU population, where it is expected a decrease in the 20-29 age group and an increase in the above 65 age group (Gracia & Albisu, 2001), one might expect a general decrease in the consumption of those types of meat particularly associated with high levels of cholesterol and fat content. A study by Menkaus *et al.* (1993) cited by Resurreccion (2003) shows that cholesterol, convenience characteristics, calorie content, artificial ingredients, the manner in which beef is displayed in the store and price, are amongst the main consumers' concerns towards beef. Grunert (1997), also looking at quality aspects of beef and covering four EU member states (Germany, France, Spain and the UK) concluded that the most important were: taste, tenderness, juiciness, freshness, leanness, health, and nutrition.

Outbreaks in the meat sector have prompted consumer concerns towards meat and con-

sumers' perception of meat change quite fast which makes the analysis of meat consumer behaviour a difficult subject (Grunert, 1997). Nevertheless, it seems one can say that demand for meat is increasingly influenced by factors such as safety concerns, convenience, change in lifestyles, change in demographic characteristics, amongst others.

Bernués, Olaizola and Corcoran (2003a), argue, *new extrinsic attributes of meat are being increasingly considered in the consumer decision making process.* They also state that attributes, which relate to the quality of the production process, are becoming more relevant to the consumer, helping him to infer on the quality of a particular type of meat. In fact, Corcoran (1999) argue that consumers are becoming more demanding in areas such as animal welfare, environmentally friendly production, origin, ethics and natural methods of production, amongst others. Nevertheless, consumers behave in different ways and in what concerns beef, their behaviour is highly dependent upon their perceptions associated with risk and also on the importance that prices and incomes have on their consumption decisions. Resurreccion (2003) argues that the higher price of beef relative to other meat prices might explain the fact that beef is *no longer consumed in the same quantities as it was in the past.* Economic factors influence consumption patterns and a study has shown that 10% increase in income is associated with a 0.7% increase in demand for ready-to-eat meals (USDA/ERS, 2002, cited by Resurreccion, 2003).

The meat sector has reached its maturity stage; therefore, as argued by Resurreccion (2003), in order to promote some growth in a sector with such characteristics, there should be investment in innovation and product development. Understanding consumer preferences towards meat is a key factor to be competitive in today's market. Beef and veal, as well as sheep and goat, have had a negative trend in consumption and health and safety concerns might partly explain such tendency. In fact, the higher knowledge on the link between health and diet and the recent scares that took place in the meat sector, highlight the importance of nutrition, saturated fat and cholesterol, and led to a shift away from high-fat and high-protein diets Resurreccion (2003).

In Portugal, the beef sector is moving towards producing beef more in accordance with consumer requirements. In this respect we can mention the increase in *quality labelled beef* (i.e. *PDO* and *PGI* beef), a result of implemented policies[5], which pretends to be a way of valuing producers of foods with a recognisable local identity, but also the result of an attempt to meet market requirements, Table 5.4.

Table 5.4: *Production of total beef and quality labelled beef in Portugal: IDHRa (2004, 2005, 2006, 2007b).*

	1997	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***a.g.r.***[b] ***(%)***
Total beef[a]	103613.00	96026.00	97435.00	99980.00	94942.00	96395.00	78689.00	92350.00	92018.00	-1.47
Quality labelled beef[a]	1369.20	1214.10	1379.90	1585.50	1774.00	1977.00	2114.00	1901.00	2479.00	7.70
Quality labelled beef in total beef(%)	1.32	1.26	1.42	1.59	1.87	2.05	2.69	2.06	2.69	

[a]In tones of carcasses, slaughters approved for consumption. [b]Annual growth rate.

A case worth mentioning is the effort undertaken by the pork industry in the United States. In the 1990s pork was commercialised as a healthier alternative to chicken with the *pork: the other white meat* advertising campaign (Resurreccion, 2003). This campaign was launched in 1997 and highlighted the leaner and lower fat cuts. Consumers' quality perception on a

[5]Such as EU Regulation 2081/92.

particular product determined their purchase decisions. Grunert (1997) states that consumers' quality perception on beef is mainly based on fat content and colour. The development of beef with low-fat content might be a way to increase beef and veal consumption.

It seems reasonable to conclude that although fresh meat has been mainly sold as a commodity, and therefore very often the opportunity to be marketed as a value added product is lost, there exists the possibility to market fresh meat as a differentiated product. A study undertaken in Denmark has proved that branding can *play a major role in the marketing of differentiated meat products* (Grunert, Bredahl & Brunsø, 2004; Resurreccion, 2003). The same authors also argue that meat products can also be differentiated by eating quality, health and convenience, and by process characteristics (traditionally produced meat). Examples already successful in the market can be mentioned: *PDO* beef, chicken cuts and other convenient forms, pork marketed as a leaner meat, among others, all of them responding to market signals. That is to say satisfying today's demand for higher convenience, safety, nutrition, and health.

Worth mentioning is also the vintage effect, a concept developed by Ritson and Hutchins (1995), which means that *trends in consumption over time occur not because individual consumers are switching from one product to another, but because, for a declining product, heavy consumers are dying and not being replaced by new younger consumers and, for a growing product, over time an increase proportion of the population favour consumption of it* (Ritson, 2004). Hence the main idea behind the vintage effect is that young people may acquire food preferences, which they carry through with them, as they get older. Therefore, considering the new concerns towards demand for beef and other types of meat, in a few years time we can assist to the vintage effect explaining partly the trends in meat consumption.

5.10 Conclusion

The consumption of total meat in the EU, from 1990 to 2001, increased by around 2%. This increase was mainly attributed to the increase in poultry and pork meats. Increase in total meat *per capita* consumption did not follow the same magnitude as the increase in the two above mentioned meats mainly due to the decrease in beef and veal *per capita* consumption. Gracia and Albisu (2001) also reported an increase in poultry and pig meat consumption for the period 1991-1996. However, these authors report a decrease of 2% in average fresh meat consumption in the EU between 1991 and 19961, attributing this decrease to *BSE*. Our results show that in the period 1990-2001 EU *per capita* meat consumption increased by 2.1%.

For the last decade, and based on *per capita* consumption, pig meat has been the most consumed meat in the EU. The decline in beef consumption associated with the increase in poultry and pig consumption indicate that beef is now facing more fierce competition.

In terms of total meat *per capita* consumption in Portugal, *per capita* consumption of poultry has been above EU average whilst beef and veal has been below EU average. Pig meat consumption, though normally below, has been above EU average for the last three years (1999 to 2001). Sheep and goat *per capita* consumption since 1995 has been close to EU levels.

Meat can be marketed as a differentiated product and efforts should be undertaken by all those involved in the meat chain to differentiate meat trough branding, eating quality, health, nutrition and by process characteristics.

5.A Appendix

Table 5.5: Evolution of positive cases in the EU since *BSE* was recognised: EC (2004a).

	<1988	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
BE	0	0	0	0	0	0	0	0	0	0	1	6	3	9	46	38	15
DK	0	0	0	0	0	1[a]	0	0	0	0	0	0	0	1	6	3	2
DE	0	0	0	0	0	1[a]	0	3[a]	0	0	2[a]	0	0	7	125	106	54
GR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
ES	0	0	0	0	0	0	0	0	0	0	0	0	0	2	82	134	173
FR	0	0	0	0	5	0	1	4	3	12	6	18	31[b]	162	277	240	138
IE	0	0	15[b]	14[b]	17[b]	18[b]	16	19[b]	16[b]	74	80	83	95	149	246	333	185
IT	0	0	0	0	0	0	0	2[a]	0	0	0	0	0	0	50	36[b]	31
LX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
NL	0	0	0	0	0	0	0	0	0	0	2	2	2	2	20	24	19
AT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
PT	0	0	0	1[a]	1[a]	1[a]	3[a]	12	15	31	30	127	159	150[b]	113	86[b]	133[b]
FI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
SE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK	442	2473	7166	14294	25202	37056	34829	24290	14475	8090	4335	3197	2281	1428	1194	1130	614
EU	442	2473	7181	14309	25225	37077	34849	24330	14509	8207	4457	3433	2571	1910	2162	2131	1364

BE-Belgium; DK-Denmark; DE-Germany; GR-Greece; ES-Spain; FR-France; IE-Ireland; IT-Italy; LX-Luxembourg; NL-Netherlands; AT-Austria; PT-Portugal; FI-Finland; SE-Sweden; UK-United Kingdom.

[a] All imported cases.

[b] Including imported cases (Ireland-5 cases/1989, 1 case/1990/94/95, and 2 cases/1991/92; France-1 case/1999; Portugal-1 case/2000/02/03; Italy-1 case/2002).

Table 5.6: Positive cases in *scrapie* in sheep and goats: EC (2004a).

	Number of positive cases 2003	
	Sheep	***Goats***
Belgium	2	0
Denmark	0	0
Germany	23	0
Greece	124	19
Spain	138	1
France	750	19
Ireland	49	0
Italy	190	6
Luxembourg	0	0
Netherlands	63	0
Austria	0	0
Portugal	6	0
Finland	0	0
Sweden	4	0
United Kingdom	438	1
EU	1787	46

An econometric model was used to test the existence of changes in the Portuguese consumers' beef demand, resulted from the crises that occurred with the appearance of BSE, in beef, and nitrofurans, in poultry meat. The annual data for Portugal for the period from 1983 to 2003 were used for the estimation. The empirical results suggest that the crises have affected both demand for beef and poultry meat, as well as product substitution between different types of meat. The levels of beef consumption did not recover immediately to the levels before BSE crisis, but rather tend to slowly restore the previous pattern.

6

Portuguese consumers' preferences in situation of crises[1]

6.1 Introduction

Recently, food safety has become one of the most important issues among consumers. Besides socio-economic factors, which influence consumers' choices, such as prices, income, and life-style, food safety also affects consumers' preferences. The consumers' response to the crises, triggered off by the information on food safety, had significant consequences on the food production and industry.

The announcement, on 20th of March 1996, of the possibility of existence of a relation between *Bovine Spongiform Encephalopathy* (*BSE*) and *Creutzfeldt-Jacob disease* (*CJD*), provoked a confidence crisis among European consumers with regard to beef (Burton, Young & Cromb, 1999; Verbeke & Ward, 2001; Mangen & Burrell, 2001; Sanujan & Dawson, 2003; Banović *et al.*, 2004), Chapter 5. Likewise, the appearance of first cases of *BSE* in Japan, in 2001, and in the United States, at the end of 2003, triggered off changes in meat market which were evaluated (Jin & Koo, 2003; Crowley & Shimazaki, 2005). Moreover, consumers' confidence was also affected by the nitrofurans crisis that occurred in Portugal in 2003.

Therefore, the present work aims to analyse the effects of crises on the Portuguese meat sector, and in particular those effects associated to the appearance of *BSE* and *nitrofurans* crises. The evolution of the *per capita* consumption of various meat types, for the period 1983-2003, was analysed in relation to a different set of variables, mainly prices and income. These are traditionally considered as explaining factors of *per capita* consumption, and socio-demographic changes. Quality attributes, like convenience and safety were considered as having potential effects on the consumers' preference structure.

[1]This chapter has been published as: Barreira, M.M., Banović, M. & Aguiar Fontes, M. (2005). As preferências dos consumidores portugueses face às crises. In D.O. Monteiro, A.S.G. Santos, E.N.D.G. Mena, R.B. Mestre & S.M.R. Sacoto (Eds.), *Proceedings of the XV Congresso de Zootecnia* (pp. 187-191), UTAD: Vila Real, Portugal.

6.2 Methodology

The econometric model was estimated using demand equations for four meat types: beef, pork, poultry and other meat. The model represents an *almost ideal system of demand functions* (*AIDS*), widely used in demand analyses of food products since its introduction by Deaton and Muelbauer (1980), and already applied to the Portuguese meat sector (Barreira & Duarte, 1997; Barreira & Vicente, 2001).

This model hypothesises that the expenditure proportion of each good in total meat expenditure is explained by *per capita* income (meat expenditure) and by the retail prices of various meat types, hence, assuming low separability between the meat group and other food and non-food products.

Convenience issues that might affect consumers' preferences were also considered in the model, and included as an explanatory variable for *working women*. The evaluation of the crises effects, provoked by the appearance of *BSE* and *nitrofurans*, was conducted using dummy variables that, in each year, take a zero value before the crisis and a value of one after its appearance.

The system of equations was estimated by the method of minimal least squares, and the hypotheses of the economic theory were statistically validated. The annual data for Portugal, for the period 1983-2003, are presented in Table 6.1.

Table 6.1: *Summary of the variables included in the model.*

Variable	***Description***		***Mean***[a]
qb	*Per capita* beef consumption	(kg)	15.12
qs	*Per capita* pork consumption	(kg)	33.14
qa	*Per capita* poultry consumption	(kg)	22.65
qo	*Per capita* other meat consumption	(kg)	12.07
M	Total *per capita* meat expenditure	(€)	312.29
BSE	Takes a value of 1 in 1976 and value of 0 otherwise		0.38
Nitrof	Takes a value of 1 in 2003 and value of 0 otherwise		0.05
Dem	*Activity rate*: active population of women relative to total population of women		41.88
pb	Retail price of beef - 1^{st} class without bone	(€/kg)	7.32
ps	Retail price of pork - loin cutlets	(€/kg)	4.24
pa	Retail price of chicken	(€/kg)	1.91
po	Retail price of foot/hoof and pastern	(€/kg)	1.48

[a] Calculated from EUROSTAT (2004a); INE (2004a,c).

Prices and meat expenditures deflated by the Consumer Price Index for food products, base 1991=100.

6.3 Results

The results of the model estimation are presented in Table 6.2. The analyses of these results suggest, assuming all variables constants, that the crises have significantly affected the structure of Portuguese consumers' preferences.

The expenditure proportion for beef has significantly decreased with the appearance of *BSE*, while it has significantly increased for pork and poultry meat. *Nitrofurans* crisis resulted in a significant decrease in poultry meat expenditure, and had no significant influence on other meat types. The demographic variable *working women* seems to have a positive impact on poultry expenditure, suggesting that, of all meat types, poultry meat might respond the most to the demand for convenience.

The elasticities of ordinary demand-expenditure and demand-price are presented in Table 6.3, while those of compensated demand, calculated for the average from the obtained model estimates, are given in Table 6.4.

All the demand-expenditure elasticities were significantly different from zero, being larger than one in the case of beef and pork, and less than one for poultry and other meat, meaning that an increase in 1% of *per capita* meat expenditure brings a raise higher than 1% for the first two types of meat and smaller than 1% for the other two.

The obtained values for demand-price direct elasticities confirmed that all meat types had an inelastic demand, and that cross elasticities suggest liquid substitution between beef and poultry meat, and between pork and other meat.

Table 6.2: *Parameter estimates of the model*[a].

Expenditure proportion	***Beef***	***Pork***	***Poultry***	***Other meat***[b]
Intercept	0.360***	0.445***	0.137***	0.058***
	(0.002)	(0.002)	(0.001)	(0.001)
Expenditure	0.011	0.066	-0.066**	-0.012
	(0.041)	(0.040)	(0.019)	(0.009)
BSE	-0.079***	0.052***	0.027***	-0.001
	(0.009)	(0.009)	(0.004)	(0.002)
Demographics	0.001	-0.006	0.004**	-0.001
	(0.003)	(0.003)	(0.001)	(0.001)
Nitrofurans	0.011	0.002	-0.012*	-0.002
	(0.012)	(0.013)	(0.005)	(0.003)
Prices				
Beef	0.157**	-0.139**	0.010	-0.028*
	(0.048)	(0.041)	(0.026)	(0.011)
Pork		0.206***	-0.063**	-0,004
		(0.043)	(0.017)	(0.010)
Poultry			0.053*	-0.001
			(0.022)	(0.008)
Other meat				0.033***
				(0.008)
R^2 *adjusted*	0.920	0.848	0.908	
Durbin-Watson	1.968	1.904	2.470	

[a]Restrictions in homogeneity and symmetry imposed.

All the variables normalized with respect to the mean.
[b]Equation taken from the estimation.
*, ** and *** significant at 5%, 1% and 0.1%, respectively.
Estimated errors given in parenthesis.

Table 6.3: *Ordinary demand-price and demand-expenditure elasticities.*

Q[a]	***Prices***				***E***[b]
	Beef	***Pork***	***Poultry***	***Other meat***	
Beef	-0.575**	-0.401***	0.025	-0.080*	1.032***
	(0.160)	(0.098)	(0.067)	(0.033)	(0.113)
Pork	-0.366**	-0.602***	-0.161***	-0.019	1.148***
	(0.111)	(0.085)	(0.038)	(0.025)	(0.089)
Poultry	0.249	-0.392**	-0.549**	0.024	0.520**
	(0.227)	(0.120)	(0.150)	(0.063)	(0.141)
Other meat	-0.414	0.013	0.018	-0.417**	0.800***
	(0.226)	(0.161)	(0.135)	(0.141)	(0.149)

Table 6.4: *Compensated demand-price elasticities.*

Q[a]	***Prices***			
	Beef	***Pork***	***Poultry***	***Other meat***
Beef	-0.204	-0.058	0.166*	-0.020
	(0.133)	(0.113)	(0.072)	(0.030)
Pork	0.047	-0.091	-0.004	-0.048*
	(0.091)	(0.096)	(0.039)	(0.023)
Poultry	0.436*	-0.012	-0.477**	0.054
	(0.189)	(0.126)	(0.160)	(0.061)
Other meat	-0.126	0.369*	0.128	-0.370*
	(0.188)	(0.174)	(0.144)	(0.139)

All the variables normalized with respect to the mean; [a]Quantities; [b]Meat expenditure.

*, ** and *** significant at 5%, 1% and 0.1%, respectively. Estimated errors given in parenthesis.

6.4 Conclusion

The factors traditionally, considered in the demand for food products, income and prices, still explain to a larger degree the Portuguese consumers' behaviour. The appearance of crises in the meat sector had instantaneous effects, that resulted in a strong decline in *per capita* beef and poultry consumption. The levels of beef consumption did not recover immediately to the levels before *BSE* crisis, but rather tend to slowly restore the previous pattern.

Changing habits of consumers and the overall lack of confidence towards beef after the BSE and other crisis, resulted in a decline in demand relative to other meats. This obliged producers and all those enrolled in the meat chain to concentrate their efforts to look upon ways to improve their competitiveness and regain consumer confidence towards beef. Tools used to address these concerns are mainly labelling and traceability of food products, as well as differentiation of meat products, by using the specific quality labels. In this chapter, and using the Portuguese beef sector, we try to shed some light on how such differentiated products can contribute for rural development and promote product genuinity. Adding value to traditional products, is a way to guarantee economic sustainability of agricultural activities and, consequently, of rural economies, promoting rural development. A deficient behaviour in terms of management and organisation, as well as the incapability to satisfy major market requirements, might compromise the success of such strategies.

7

The role of specific quality labels in rural development: Lessons from Portuguese experience[1]

7.1 Introduction

Recently increasing consumers' demand towards quality and safety of food products as well as the desire for cultural identification have generated the demand for higher quality and higher status agricultural products, but have also created the market for value added products that carry a strong identification with the particular region of origin (Loureiro & McCluskey, 2000).

Indeed, the consumer survey undertaken within Project AGRO 422 in order to explore Portuguese consumer behaviour towards beef showed that besides high valorisation of intrinsic beef attributes, such as freshness, appearance, and tenderness, Portuguese consumers regard certified beef and origin as highly important, trusting more in domestic beef, produced in accordance with proper animal feed and animal welfare (Banović *et al.*, 2006b).

The demand for higher dietary, health and safety standards in beef, but also for certification and reassurance of beef's origins and production methods, were addressed through using the tools like labelling and traceability of food products as well as differentiation of meat products, at the level of eating quality, health, and convenience, and process characteristics.

The strategy of production of differentiated beef, that might be sought by the Portuguese consumers, because of its typicality, health quality, and environmental consciousness, is also particularly suited for less-favoured areas, where large areas of Portugal are included, and may be seen as a comparative advantage that influence the rural development of these regions.

[1]This chapter has been published as: Banović, M., Barreira, M.M., Fraústo da Silva, M., Lemos, J.P.C., Aguiar Fontes, M. & Jorge, R. (2008). The role of specific quality labels in rural development: Lessons from Portuguese experience. In D. Tomić & M.M. Ševarlić (Eds.), *Development of agriculture and rural areas in Central and Eastern Europe* (pp. 439-448). Beograd: Mladost-biro, Serbia.

7.2 Quality labelling regulations

In order to respond to the undergoing gradual change in consumer behaviour Portugal has made an effort and implemented some food policies, thus, influencing the decision-making environment of food producers, food consumers and food marketing.

In 1994 Portugal started implementation of quality labelling system namely, two regulations:

(i) regulation on the protection of geographical indications and designations of origin for agricultural products and foodstuffs[2], and

(ii) regulation on certificates of specific character for agricultural products and foodstuffs[3], brought to light by the EU in 1992.

The first regulation, on protection of names of foodstuff, distinguishes between two categories of protected names: *Protected Designation of Origin* (*PDO*) and *Protected Geographical Indications* (*PGI*), where the distinction between the two categories depends on how closely the product is linked to the specific geographical area whose name it bears' (EC, 2004b). The purpose of the second regulation is the protection of traditional recipes and to take advantage of the *specific character* of the product which distinguishes an agricultural product from other similar products by granting a certificate of this *specific character* under quality label: *Traditional Specialities Guaranteed* (*TSG*).

Quality labelling in that way provided several important features (EC, 2004b), mainly:

(i) promotion of the rural development, through the encouragement of the diverse agricultural production;

(ii) protection of the product names from misuse and imitation, and also ultimately

(iii) giving the consumers more information and more choice possibilities of products meeting the demand for authenticity, taste, tradition, and quality.

The largest amount of quality labelled products registered at the EC (around 90%) covers six out of twenty-five countries, where Portugal is on the third place after France and Italy (Martínez, 2006). Quality labelling has been applied to a wide range of food products[4] in Portugal, where meat and meat based products are most numerous.

Portugal has 116 specific quality labels, from which 56 are *PDO*, 48 are *PGI*, and 12 are nationally protected. Nationally protected specific quality labels are *Designation of Origin* (*DO*) and *Geographical Indication* (*GI*) which correspond to the *PDO* and *PGI* quality labels, but within the national boundaries. From 12 nationally protected quality labels, 9 are *Designation of Origin* (*DO*) and 3 are *Geographical Indication* (*GI*) (IDHRa, 2007a).

Since, quality labelling became a practice in Portugal; food products linked with *PDO* and *PGI* labels had an important role in the establishment of the strategies of agricultural enterprises and in rural development.

[2]Regulation (EEC) n 2081/92.
[3]Regulation (EEC) n 2082/92.
[4]Such as: fresh meat (and offal), meat products (cooked, salted,smoked, etc.), cheeses, fruits, and vegetables.

7.3 Quality labelled beef market in Portugal

In the last century, the number of animals of Portuguese cattle breeds was decreasing rapidly, mainly due to the mechanisation of agriculture, movements of rural population to the industrialised areas, expansion of the cattle with higher productivity, and with the preference towards intensive cattle production. Even though the mechanisation of agriculture opened the possibility to use the indigenous cattle breeds for production of meat, the low productivity of these breeds compared to the breeds specialised for meat production, completely set them aside (Fraústo da Silva, 1996). Moreover, Portuguese farmers used indigenous cattle for crossbreeding with cattle specialised for meat production in order to obtain better final results of meat production and higher income. All these factors affected Portuguese indigenous cattle breeds in that way that some were almost on the edge of extinction, and Portugal was loosing its natural heritage.

However, use of cattle breeds specialised for meat production and intensification of beef production did not significantly increase the competitiveness of the Portuguese beef sector, which was very low when comparing to the other EU countries, and again had a negative social impact on rural areas. Additionally, one must bear in mind that the most of the Portuguese rural space is classified by the EU as less-favoured region, where great parts of the agricultural soil is poor and agricultural activity is limited. The fact that breeds specialised for meat production needed better conditions than indigenous ones, left an important part of the Portuguese agricultural land abandoned. Consequently, besides losing its genetic cattle heritage, some agricultural areas that could be used for rising indigenous cattle were not utilised.

Therefore, the implementation of quality labels to beef had an important impact on the valorisation and conservation of natural resources. The Portuguese genetic cattle heritage was embraced and at the same time agricultural land kept alive, fixing the farmers in the rural areas. Furthermore, quality labelling led to diversification of beef production, adding-value to the indigenous cattle breeds. Also, the complete beef production transparency due to the quality labelling and acknowledgement on existence of such a beef led to increase of consumers' confidence towards quality labelled beef.

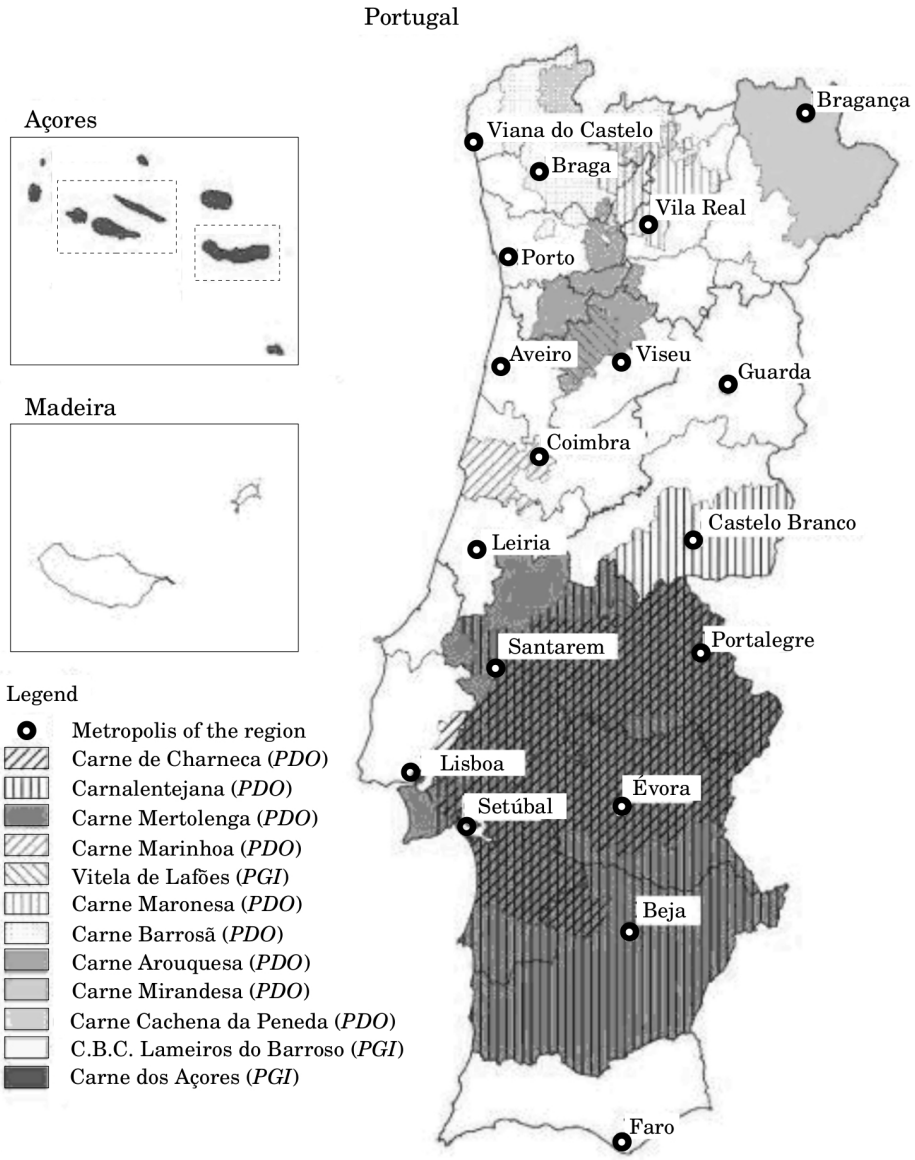
Of 116 quality labelled products in Portugal, quality labelled beef comes on the third place, after the meat based products and fruits (IDHRa, 2007a). Worth mentioning that Portugal is the member state with the highest number of beef with specific quality labels (12) where, 9 are *PDO* and 3 *PGI* labels (IDHRa, 2007a; EC, 2004b). To highlight that one TSG beef-*Carne de Bovino Tradicional do Montado* is under provisional register, waiting to be approved.

In Figure 7.1, 12 *PDO* and *PGI* beefs are presented with their region of origin, as well as their areas of production and slaughter. From these 12 quality labelled beef, *PGI* beef-*Carne dos Açores* and *PDO* beef - *Carne Cachena da Peneda* were not considered for this research purposes, due to the lack of data.

Beef production in terms of slaughters approved for consumption with quality labels has increased, from 1997 to 2005, at an annual growth rate of 7.7%, while total beef has decreased in the same period by 1.5%, Table 5.4.

The *PDO* beef that contributed the most for total production of quality labelled beef is clearly *PDO* beef-*Carnalentejana* which accounted for 42.4% of quality labelled beef production in 2005, followed by *PDO* beef-*Carne Mertolenga*, and *PDO* beef-*Carne Mirandesa*, Figure 7.2.

Figure 7.1: *Distribution of beef with specific quality labels in Portugal: IDHRa (2006) and EC (2004b).*

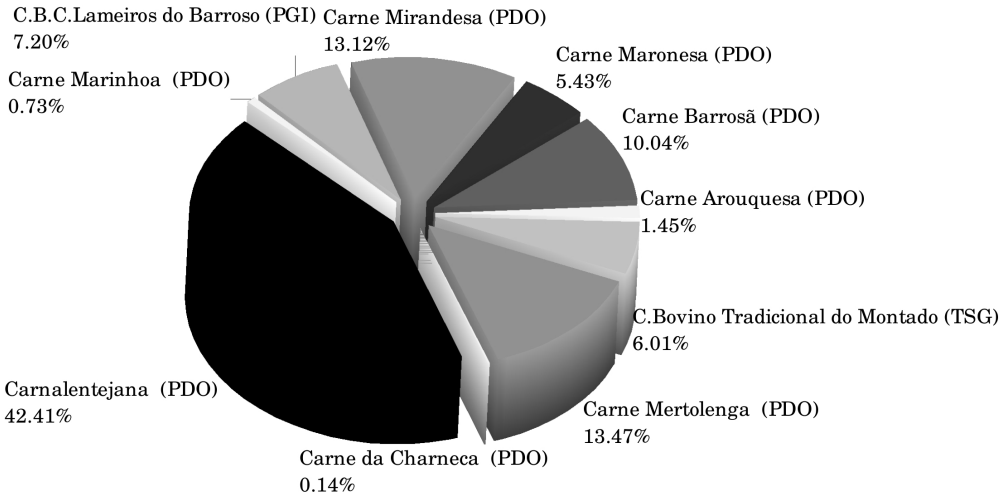


Furthermore, besides the increase in quantity since 1997 until 2005, the value of total production of quality labelled beef has also increased by 8.0% (IDHRa, 2004, 2007b). The increase in *PDO* and *PGI* beef represents partly the answer of production to the sensitive changes in market conditions. One can suppose that these trends might be a sign that the market is positively responding towards this differentiation in beef products and that some consumers regard this beef as a safer and higher quality product.

In fact, the Portuguese consumer survey undertaken showed that *PDO* beef is perceived by consumers as a guarantee of product genuineness, that promotes higher development of the region of origin, but also is generally perceived as safer, more regular and higher quality beef (Banović *et al.*, 2006b; Aguiar Fontes *et al.*, 2008), Chapter 8. In addition, increase of total production of quality labelled beef both in quantity and in value might be also showing that beef producers in this sector were not so affected by the *BSE* crisis as the beef producers of

undifferentiated beef, and can also mean that consumers were feeling more confident to purchase quality labelled beef associating it to a safer product. This assumption can be confirmed by the undertaken Portuguese consumer survey which showed that consumers were affected by *BSE* crisis concerning beef in general, but when compared to *PDO* beef, a significant percentage of the respondents pointed out that they increased the consumption of the *PDO* beef, feeling safer to consume this beef (Project AGRO 422).

Figure 7.2: *Distribution of quality labelled beef production (2005): IDHRa (2007b).*



Likewise, some differentiation is recognised at the producer level: a brief look over the prices of beef produced in Portugal shows that prices of quality labelled beef are usually higher than those of undifferentiated beef. In fact, during the period from 1997 to 2005, the prices of quality labelled veal (6.3 €/kg carcass, in 2005) were much higher than the undifferentiated veal prices (4.0 €/kg carcass, in 2005), while this proportion is smaller considering young bulls (quality labelled young bulls: 3.6 €/kg carcass, in 2005; undifferentiated young bulls 2.9 €/kg carcass, in 2005) (IDHRa, 2007b; INE, 2007). The same consumer study also showed that there seems to exist a willingness to pay for *PDO* beef, due to its favourable characteristics, and that distributors are willing to buy and market this beef (Aguiar Fontes *et al.*, 2008), Chapter 8.

Concerning the distribution channels of quality labelled beef the large amount of *PDO* and *PGI* beef is sold mainly through the large distribution chains. In 2005 around 76% of *PDO* and *PGI* beef has been handled through these channels, and this can be explained by the fact that quality labelled beef with highest market share, namely *Carnalentejana* (*PDO*), *Carne Mertolenga* (*PDO*) and *Carne Barrosã* (*PDO*) are sold through these chains (IDHRa, 2007b). Nevertheless, share of other distribution channels, namely butchers and restaurants, although small is increasing. Quality labelled beef with smaller market shares, like *PDO* beef-*Carne Arouquesa* and *PDO* beef-*Carne Marinhoa*, are manly sold through butchers and restaurants. *PDO* beef-*Carne Mirandesa* has, since 2001, increased the amount of beef sold to the wholesalers, giving out 48% in 2005 (IDHRa, 2004, 2007b).

Worth mentioning also that 30% of total production of quality labelled beef are sold within the respective region of origin, keeping this added-value (IDHRa, 2007b). From the 70% of

quality labelled beef sold outside the region of origin, none is exported but only distributed within the national boundaries.

7.4 Discussion and conclusion

Nowadays, the Portuguese beef sector is facing great challenges. The increasing consumers' concerns towards quality, safety, traceability, and demand for traditional food products that carry a strong identification with the particular region of origin have created the space for growing the market for value-added beef. Adding-value to beef by using specific quality labels represents a good strategy to increase the competitiveness in the market through the satisfaction of the end user, but also to promote the region of origin and to contribute to rural development. Moreover, specific quality labels are one of the best tools available for beef producers supported by the European and Portuguese policies. While stimulating diverse beef production, producers are provided with a new marketing tool giving some guarantees to the consumers and economic sustainability of beef production is guaranteed.

However, the lessons from Portuguese experience show that one should be cautious when exercising such strategies. A deficient behaviour in terms of management and organisation, as well as the incapability to satisfy major market requirements might compromise the success of these strategies, leading to a probable failure.

In the Portuguese case, there are some good and bad examples of exercising quality labelling. To highlight, from 12 existing beef quality labels only 25% are properly organised. The major weaknesses observed, like irregularity of distribution and supply, lack of standard meat quality, as well as the absence of promotion actions for *label-brands*, conducted some quality labelled beef to disappear from the market. Furthermore, the use of quality labelling on a particular beef that is not of prescribed *quality*, possibly can damage the collective reputation of the *label-brand*, leading to the miss-trust at the consumer level.

Therefore, Portuguese experience emphasises the need for a deeper knowledge of the major requirements for a positive impact of specific quality labels and rural development. Studies undertaken within Project AGRO 422 have shown some of the major guidelines for the positive impact of such strategies, namely at the producer level it is important to precisely define the final type of the product to a consumer (e.g. *PDO*, *PGI*), to adopt strict rules for production systems (e.g. animal feed, crossbreeding), and to define the goals of breeding programmes. In that way, following the good production practices, improvement of beef production quality can be achieved. Likewise, the same studies pointed out that at the process level, it is necessary to respect the formal requirements during loading and transporting cattle, cattle stabling (i.e. waiting for slaughter), slaughter, and refrigeration and maturation of meat, since the performed schemes affect in a considerable manner meat quality (namely tenderness). Finally, at the market level, it is indispensable to ensure the minimum levels for the fulfilment of the market exigencies, and keep supply regularity.

Apart from previous, quality labelling must include measures that not only enable the diversification of the beef production but also those that support the development and sustainability of competitive farm production. In that way, the quality labelled beef is designed to preserve the *specificity* for consumers and to create *quality* with specific prices that reflects consumers'

preferences. Again with the proper employment of specific quality labels and good production, slaughter, and distribution habits, a better balance is achieved between the consumer growing requirements towards quality, safety, and traditionally produced beef, and beef producers yielding from this added-value to beef. Finally, the promotion of quality labelled beef possessing certain characteristics considered favourable by the consumers, brings a greater benefit to the rural economy and in particular for the less-favoured rural areas, improving farmers' income and maintaining the rural population in these areas.

Part III

Basis for Research Design

All truths are easy to understand once they are discovered; the point is to discover them.

- Galileo Galilei -

The agri-food sector operates in a highly competitive global environment, with the different agents' performance being strongly influenced by the forces working in their micro and macro-environment. As many other agri-food sectors, the beef sector has been under great pressure, particularly as a consequence of different food scares and a higher demand towards food safety and quality in developed economies. The objective of this chapter is twofold: (i) to show the preliminary results of a Portuguese consumer and distributor's market surveys, and of the sensory analysis undertaken with particular quality beef, and (ii) to contribute for the discussion around beef differentiation in order to improve market competitiveness. Results suggest that tenderness is one of the most important beef attributes for both consumers and distributors, and sensory analysis confirms that it is possible to differentiate a PDO beef based on this attribute.

8

Is beef differentiation a real source of competitiveness? A combination of procedures to achieve an answer[1]

8.1 Introduction

The agri-food sector operates in a highly competitive global environment, with the performance of the different agents being strongly influenced by the forces working in their micro and macro-environment. Some countries have conditions to enhance higher competitivity and the factors of competitiveness that can be considered important are: (i) quality of human resources; (ii) science and technology; (iii) infra-structures available; (iii) quality of the finance system; (iv) degree of bureaucracy and corruption, and (v) degree of internationalization of the economy (Cardoso, 2003). Agri-food industries have to deal with all these factors.

Considering the beef sector, it has been under great pressure, like other agri-food sectors, particularly as a consequence of different food scares and higher demand towards food safety and quality in developed economies. In the European Union (EU), during the period 1990-2001, *per capita* consumption of beef and veal decreased by 19% whilst consumption of poultry and pork increased by, respectively, 26% and 9% (Banović *et al.*, 2004), Chapter 5. Concerning Portugal, and for the same period, *per capita* consumption of beef and veal decreased by 4% whilst consumption of poultry and pork have increased by, respectively, 59% and 46%. In Portugal, beef and veal *per capita* consumption was, in 2003, 17.4 kg and below EU average.

It is possible to anticipate that quantitatively, food demand in general, and beef in particular, will not increase significantly in developed economies. However, food expenditure might increase, particularly for food products associated with high quality, high safety standards and convenience. But how do consumers perceive quality beef attributes? And what about beef objective quality, is it in accordance with consumers' requirements?

[1]This chapter has been published as: Aguiar Fontes, M., Lemos, J.P.C., Banović, M., Monteiro, A.C.G., Lúcio, C., Duarte, F., Silva, M.F. & Barreira, M.M. (2008). Is beef differentiation a real source of competitiveness? A combination of procedures to achieve an answer. In R. Fanfani, E. Ball, L. Gutierrez & E. Ricci Maccarini (Eds.), *Competitiveness in Agriculture and Food Industry: US and EU Perspectives* (BUP), Bologna, Italy.

8.1.1 Background

Nowadays, and particularly in the developed world, every one talks about quality and market competitiveness and, within the food industry, these two terms are interlinked. There are two main reasons for this close relation. On one hand, the fact that the food industry produces goods that are mainly for consumer use, either directly or indirectly, and consumers demand quality products; on the other hand in today's global market one must be competitive and to gain a sustainable competitive position goods must have quality! This was the starting point of a research project currently undergoing at the *Faculdade de Medicina Veterinária* (*FMV*) and *Instituto Superior de Agronomia* (*ISA*), in Lisbon[2]. The successive crises that shaken the beef sector put the different market players of this chain under great pressure and made them aware of the need to increase their market competitiveness. The main question raised was: *What does the consumer want in beef?* That is to say: *What is a quality beef from the consumer point of view?*[3] The second and third questions were: *What is the objective quality of the beef that gets to the market?*[4]; and: *How can it be possible to increase competitiveness in the beef market?*

The analysis started and so far, work has been undertaken in order to characterise beef objective quality. A consumer market research has been conducted in order to determine Portuguese consumers' preferences towards a quality beef. Also a market research at the retail level has been undertaken. At a later stage consumer panels will be performed in order to evaluate the expected and experienced quality of a particular quality beef. Moving backwards, throughout the whole chain up to the farm where that beef originated from, the objective quality and production systems can be characterised and interlinked. Why is this so important? Mainly because in today's global market it is hard to compete based on low cost, particularly in firms/countries with low scale of production and considering the increasing pressure from distribution chains (major retailers pressuring for lower margins). Even if it was possible to compete through low cost, soon other major competitors would be able to achieve those costs. Therefore a sustainable source of competitiveness is differentiation. Hence, is Portuguese beef supply capable of making the most of a possible market differentiation?

Some differentiation has been undergoing: food products with *Protected Designation of Origin* (*PDO*) are in the market for almost a decade and are still a market niche; production and marketing of *PDO* products have to comply to rigorous specifications (production systems, breeds, animal welfare, amongst others), which often imply higher costs; traceability is now compulsory and implies some management and operational costs that, in the end, will be transferred to the end user. For the particular case of beef,can all this be used as a source of differentiation? How sensory analysis does perform for these products? Is the consumer prepared to pay for traceability and certification as a guarantee of different quality dimensions? Is *PDO* beef perceived of better quality by the consumers?

The structure of the paper will be the following: (i) brief description of the beef market in Portugal; (ii) some results of the consumer analysis undertaken; (iii) major results of the distribution analysis performed, and (iv) results of the sensory analysis done with three *PDO* products. The ultimate goal is to look at all the results and anticipate a possible way to increase

[2]Research undertaken within a ongoing project at the Faculty of Veterinary Medicine and the Agronomy Superior Institute: Project AGRO 422 (2004-2008).

[3]Subjective quality.

[4]Objective quality in the sense of characteristics that are objectively measured or appreciated and according to specific requirements.

competitiveness of Portuguese beef sector.

The major research questions (RQ) raised in the context of the present paper were:

A - At the consumer level:

RQ1: What are the most important attributes that consumers consider in their decision of buying beef?

RQ2: What is the proportion of respondents who mention knowing what PDO label is? Amongst these, what is their frequency of buying PDO beef?

RQ3: What are Portuguese consumers' perceptions towards beef quality?

RQ4: How do consumers perceive PDO beef when comparing it with undifferentiated beef?

B - At the distributors' level:

RQ5: What are the most important attributes that distributors consider in their decision of buying beef?

RQ6: Do distributors really know what consumers want? And is there a significant difference between the weight given to particular attributes by distributors and by consumers?

RQ7: What are distributor's evaluation/perception of PDO beef?

C - At the the sensory analysis level:

RQ8: Is tenderness an attribute that differentiates PDO beef?

D - Overall level:

RQ9: How can Portuguese beef competitiveness be increased?

8.1.2 Methodology

To answer all of the above mentioned research questions, the analysis was undertaken at three levels using different methodologies.

At the consumers' level, a consumer market survey was undertaken. A sample with a total number of respondents equal to 780 was interviewed. Questionnaires were implemented by students from both *ISA* and *FMV*, during autumn semester (December 2005). The students were required to directly interview the responsible for food buying in three different households[5]. Based on the responses, a descriptive analysis, as well as some multivariate data analysis (i.e. factor analysis) and statistical tests were performed. Sample characteristics, based on region of origin, age and gender of the person interviewed are described in Table 8.1.

Table 8.1: *Sample characteristics.*

Sample characteristics	***Valid percentage***
Region	
Norte	5.4
Centro	8.5
Lisboa e Vale do Tejo	76.2
Alentejo	4.1
Algarve	3.3
Madeira and Açores	2.6
Gender	
Female	76.3
Male	23.7
Age	
≤25	8.9
26-35	14.8
36-45	22.8
46-55	31.8
56-65	11.8
≥66	9.9

At the distributors' level, 10 retailers and 2 wholesalers were selected from a list of 20 Portuguese retailers and wholesalers marketing *PDO* beef. Personal interviews were performed and an attempt was made to

[5]Different in terms of social-economic characteristics, region and age.

cover retailers located in different Portuguese regions. Although the sample was small, it can be considered as representative as the major chains were included. With such a small number of respondents, a descriptive analysis was undertaken and the results were compared with those obtained at the consumers' level.

A sensory analysis was also performed. This took place with nine trained panellists who evaluated three types of *PDO* beef, two perfectly well implemented in the market and one recently introduced. This evaluation was made for three major attributes, i.e. tenderness, flavour and juiciness, and for overall appreciation.

From all the results obtained at each level of the research, an attempt was made to link them and access how competitiveness of the Portuguese beef sector can be improved. It should be highlighted that this is mainly a discussion paper and included in a broader project which ultimate goal is to define a quality policy for the beef sector in Portugal.

8.2 Market behaviour

8.2.1 The enviroment

Looking at meat consumption within the EU during the last decade, and based on gross human and *per capita* consumption, pig meat has been the most consumed meat in the EU. In 2001, pig meat accounted for 45% of total meat consumption, followed by poultry meat (24%) and beef and veal (19%). In 1990, pig meat (42%) was followed by beef and veal (23%) and then poultry meat (20%) (Banović *et al.*, 2004), Chapter 4. According to Banović, Barreira and Aguiar Fontes (2006a), in Portugal, in 2000 meat consumption accounted for 28.9% of total food expenditure. In 1990 and 1995 the proportion was, respectively, 31.6% and 30.1% of total food products expenditure, Chapter 5.

In 2002 there were in Portugal twelve protected denominations of beef, namely, 9 *Protected Denomination of Origin* (*PDO*) and 3 *Protected Geographical Indication* (*PGI*) (IDHRa, 2004, 2005). Production of *PDO* beef in Portugal has increased in the last years, followed by a declining trend in the production of total beef, Table 5.4. Though one cannot forget that policies have been put into force towards the production of this kind of products, these trends might be a sign that the market is positively responding towards this differentiation in beef products. A priori we can expect such products to be regarded as having higher quality and safety, requirements that have been at the core of consumer demands in developed economies.

While assisting to this trend in the production of beef, it is clear that some differentiation is recognized at the market level, translated by the prices associated with *PDO* beef and undifferentiated beef. In fact, a brief look over the prices of some of the *PDO* beef produced in Portugal shows that, on average, prices are usually higher than those of undifferentiated beef, at the producers level (IDHRa, 2004,b, 2005; GPPAA, 2000, 2001, 2002).

The following Subsections 8.2.2 and 8.2.3 will give the main results obtained with the research undertaken at different levels. It should be highlighted that the survey done at the distribution level is mainly an exploratory one, though major Portuguese retailers were included.

8.2.2 Consumers preferences for beef in Portugal

Products of specific quality, namely the *PDOs*[6] pretend to be a way of valuing food products with a recognisable local identity. According to some authors (OECD, 1999) this can work as: (i) a source of protection for regional productions; (ii) a marketing improvement, and (iii) an instrument to allow consumers identification of products referring to particular regions. Some (Tregear, Moxey & Kuznesof, 1997) remark that *despite the existence of these regional food policies, there appears to have been little empirical research into the validity of the underlying premise that consumers perceive and value place identification, or regionality, in foodstuffs, nor into the relative importance of official certification in influencing these perceptions and valuations.*

As mentioned previously, a consumer market research has been undertaken in order to assess Portuguese consumers' preferences (motivations/attitudes) and behaviour towards beef. A paper with more detailed results of this research will be put forward. Therefore we will be presenting here just a minor part of such results looking in particular to consumer perceptions of *PDO* beef.

Before going in depth into *PDO* beef, an attempt was made to identify the most important factors for the Portuguese consumers when deciding to buy fresh beef. Indeed the three major factors influencing this decision are, in order of importance (based on average scores that range from 1 = *not at all important* and 5 = *extremely important*): *taste*, *health*, and *appearance*. This can lead us to conclude that beef is considered to be a tasty meat, where appearance and the link health-diet weight considerably in the decision for buying it or not. Price only came 7^{th} from a list of nine attributes.

A *factor analysis* allowed the identification of three factors (*eigenvalues* above one) explaining 59% of total variance, Table 8.2. These factors can be interpreted as follows:

Table 8.2: *Attributes influencing buying decisions.*

Variables	***Factor 1*** ***Taste & health***	***Factor 2*** ***Convenience***	***Factor 3*** ***Price***
Health	***0.63***	-0.11	0.48
Taste	***0.80***	0.08	0.19
Appreciated by all at home	***0.77***	0.31	-0.06
Easy to prepare	0.33	***0.52***	0.17
Being a habit to consume	0.46	***0.53***	-0.22
Can be prepared under a variety of ways	0.08	***0.79***	0.07
It is appropriate for special occasions	-0.02	***0.69***	0.29
Price	-0.01	0.18	***0.78***
Appearance	0.42	0.19	***0.54***
Eigenvalue	2.13	1.84	1.33
Variance (%)	23.68	20.49	14.76
Cumulative variance (%)	23.68	44.16	58.92

Bartletts test for sphericity: $\chi^2(36)=1177.45$ (<0.001).

Kaiser-Meyer-Olkin measure of sampling adequacy: $KMO=0.80$.

Loadings were derived for each of these factors using a *Varimax rotation.*

Factor 1: The attributes with the highest contribution for this factor are *taste*, *appreciated by all at home*, and *health*. The attributes *taste* and *health* scored on average the highest levels in terms of importance.

Factor 2: The items that loaded most heavily on this factor: *can be prepared under a variety of ways*, *appropriate for special occasions*, *being a habit to consume*, and *easy to prepare*, are highly associated with convenience.

[6]Regulated by EU Regulation 2081/92.

Factor 3: *Price*, and *appearance* were the items that contributed the most for this factor. The price-conscious consumers, but where appearance also has a word in the final decision, will give more weight to this factor in their final decision.

It is possible to conclude that respondents differentiate the above nine attributes and group them in three distinct factors: ***taste & health***, ***convenience***, and ***price***. ***Taste & health*** are considered, by the respondents, as the most important attributes in the decision of buying beef and are included in *Factor 1*. The other attribute that rank third in order of importance, *appearance*, is included in *Factor 3* with ***price***. This reflects the close linkage for consumers between *price* and *appearance*.

After looking at the factors influencing the decision of buying beef, respondents were asked to indicate their degree of agreement with several statements concerning beef (using a scale from 1 = *total disagreement* to 5 = *total agreement*). It should be mentioned that exactly the same statements were presented to the distributors interviewed and the comparison of the results obtained will be given in the next Subsection 8.2.3, Table 8.5. Results show that the statements that obtained the higher degree of agreement on average are, *freshness...*, *appearance...*, and *tenderness of beef is highly important*. On the other hand, the statements: *I am very sensitive to promotions*, and: *Price is determinant in the decision of buying*, received the lower degree of concordance.

Another objective of the survey was to understand how consumers perceive *PDO* beef when comparing it with other beef (mainly undifferentiated beef). Consumers were therefore asked to give their level of agreement with a series of statements (using a scale from 1 = *total disagreement* to 5 = *total agreement*), Table 8.3. The same question was asked at the distribution level and the joint analysis will be given in the next Subsection 8.2.3.

Table 8.3: *Comparing PDO beef and undifferentiated beef.*

Statements: PDO beef...	***Average score***	***Mode***	***Standard dev.***
is a guarantee of the product genuineness	3.97	4.00	0.69
promotes a higher development of the region of origin	3.91	4.00	0.72
is always safer	3.78	4.00	0.70
has always a more regular quality	3.65	4.00	0.65
is always more expensive	3.62	3.00	0.76
is always of a higher quality	3.60	4.00	0.74
is always juicier	3.40	3.00	0.70
is much harder to find	3.36	3.00	0.88
is always tender	3.33	3.00	0.71
is a source of higher incomes for their producers	3.31	3.00	0.73
is always darker	3.23	3.00	0.65
I am more sensitive to PDO beef promotions	2.98	3.00	0.84
is always marketed in a black package	2.97	3.00	0.59

Consumers seem to associate *PDO* beef to a safer beef and to a more regular and higher quality, though for approximately 54% of the respondents this is at a higher price. It is also widely acknowledged that *PDO* beef is a guarantee of the genuineness of the product and that it promotes a higher development of the region of origin. The same analysis performed separately for those consumers who know what *PDO* beef is and those who do not know, gives the same results in terms of the first three statements, though those who do know have, as expected, on average, higher scores. Notice that the first two statements, Table 8.3 the consumer can infer even if he has not experimented *PDO* beef, whilst intrinsic quality attributes (such as tenderness and juiciness) can only be ascertained after experiencing the *PDO* beef.

A *factor analysis* was also performed on these variables and allowed the identification of four

factors with *eigenvalues* above 1, explaining 63% of total variance (*Bartlett's test for sphericity*: $\chi^2(78)$=2189.52 (<0.001); *KMO*=0.84). The results, on the basis of the factor loadings, can be interpreted as follows:

Factor 1: the statements that loaded most heavily on this factor are *more regular quality*, *always safer*, *guarantee of the product genuineness*, and *promotes a higher development of the region of origin* named as ***safety, genuineness and regularity***.

Factor 2: this factor is associated with intrinsic quality attributes - *always juicier*, *always tender*, and *higher quality* - named as ***intrinsic quality***.

Factor 3: here we have statements such as *more expensive*, *much harder to find*, *darker*, and *source of higher incomes for their producers* we named this factor as ***price***. Probably the price conscious consumers give a higher score to this factor.

Factor 4: this is rather unique as it has the statements *PDO beef is always marketed in a black package*, and *I am more sensitive to PDO beef promotions*, distinct from the others in the sense they were given the lowest values and very close to indifference (***neither agree nor disagree***).

Therefore, results suggest that respondents differentiate the above thirteen attributes and grouped them in four distinct factors: ***safety, genuineness and regularity***, ***intrinsic quality***, ***price***, and the other two statements, which are mainly classified as ***neither agree nor disagree***. It should be mentioned that the statements included in *Factor 1* are all the ones that were given higher scores and that are mainly translated by the *PDO* definition.

Among the results obtained with the questionnaire survey at the consumer level, those presented here were considered to be the most relevant within the context of the present chapter and for the comparison with the distributors perception and the sensory analysis undertaken, which is given in the next Subsection 8.2.3 and Section 8.3.

8.2.3 Distributors perceptions for beef in Portugal

As previously mentioned, in order to assess major distributors opinion concerning the beef market, 10 retailers and 2 wholesalers were selected from a list of 20 Portuguese retailers and wholesalers marketing *PDO* beef. This was just an exploratory analysis so that major trends could be identified as well as major beef requirements from distributors. It is well known that retailers are placed at a privileged position, being an interface between suppliers and the final consumer.

A major research objective was to identify the most important attributes for distributors when buying beef. Clearly the four major attributes, all considered as either very or extremely important, are: *trust in supplier*, *expiring date*, *tenderness*, and *price*, followed by *fat content*, Table 8.4.

Curious enough is the fact that tenderness comes as highly important, which was also very important for consumers, but price was given a much lower score at the consumer level (came 7^{th} on a list of 9), in terms of its importance when deciding to buy beef. This is not surprising as distributors face a higher risk in their buying decision.

As pointed out previously, one of the objectives was to understand the relationship between consumers' evaluation of certain attributes and the same evaluation by distributors concerning their clients. That is to say, do retailers really know what the consumer wants? A priori the hypothesis was that retailers know what the consumers' requirements for fresh beef are. Therefore, a table with exactly the same statements that were considered in the consumer survey was presented to the distributors interviewed, which were asked to indicate the level of agreement (using a scale from 1 = *total disagreement* to 5 = *total agreement*), but based on the knowledge they have about their clients behaviour in the shops, Table 8.5. These statements refer to general opinion towards beef (attributes most appreciated in a beef).

Table 8.4: *Level of importance of attributes when buying beef.*

Attributes	***Average score***	***Mode***	***Standard dev.***
Trust in supplier	4.42	5.00	0.67
Expiring date	4.25	4.00	0.75
Tenderness	4.25	4.00	0.87
Price	4.17	5.00	0.83
Fat content	4.08	4.00	0.67
Transport conditions	4.00	5.00	0.89
Regular supplies & delivery dates	4.00	4.00	0.74
Colour	4.00	4.00	0.74

Table 8.5: *Consumers and distributors average scores for level of agreement.*

Statement	***Consumers average score***	***Distributors average score***	***p value***[a]
Freshness is fundamental	4.72	4.83	0.356
Appearance is highly important	4.48	4.67	0.219
Tenderness is highly important	4.44	4.83	0.005
Expiring date is determinant in the decision of buying	4.36	4.17	0.447
Cut is highly important	4.24	4.42	0.255
Label information is highly important	4.17	4.17	0.974
A certified beef is always better	4.07	3.75	0.232
Trust in domestic beef	4.06	4.42	0.038
Age at slaughter is determinant of tenderness	4.01	3.83	0.563
Origin is highly important	3.95	4.17	0.232
Breed highly influences beef quality	3.93	3.42	0.101
I worry about the way animals are fed	3.86	3.25	0.054
I do not mind to pay more for beef that ensure animal welfare	3.78	3.27	0.025
Organic beef is always safer	3.72	3.33	0.121
A beef with intramuscular fat is always tastier	3.60	2.92	0.005
I am enthusiastic about a beef with good appearance and ready to cook for special occasions	3.57	4.17	0.000
Beef is bad for cholesterol	3.53	3.08	0.077
Price is determinant in the decision of buying	3.23	3.83	0.014
I am very sensitive to promotions	2.63	3.92	0.000

[a] *p*-value is the significance level associated with the *t-test* for comparing differences between means assuming unequal variances.

Comparing the average scores given at the two levels of the chain, the main points to highlight are:

- the three statements with the highest level of agreement are the same for both distributors and consumers and relate to major intrinsic attributes of beef: *tenderness*, *freshness*, and *appearance*;
- prices and promotions are scored higher by distributors than by consumers. This might reflect the difficulty that consumers have to accept or to tell that price is important in their buying decisions;
- the attributes *animal welfare*, and t*he way animals are fed* are given a higher score by

consumers. This might reflect what is supposed to be *correct* in terms of social behaviour at the present times;

- consumers seem to be more sensitive concerning the link diet/health, hence giving higher scores than distributors to attributes such as *fat content*, and *cholesterol*. Distributors probably are still not so aware of such matters;

- distributors give a higher score to the statement: *I am enthusiastic about a beef with good appearance and ready to cook for special occasions*. This might translate the fact that this is a way to call for consumers' attention, a marketing tool to attract consumers, and distributors are more advanced than consumers in this respect.

As mentioned in the previous Subsection 8.2.2, distributors were also asked to state their level of agreement with a series of statements (using a scale from 1 = *total disagreement* to 5 = *total agreement*) comparing *PDO* beef and other beef. At this level of the chain, *PDO* beef is associated with exactly the same characteristics as for the final consumer: *guarantee of the genuineness of the product*, *promotes a higher development of the region of origin*, and *is a safer beef*, Table 8.6.

Table 8.6: *Comparing PDO beef and undifferentiated beef.*

Statements: PDO beef is...	***Consumers average score***	***Distributors average score***	***p value***[a]
a guarantee of the product genuineness	3.97	3.92	0.817
promotes a higher development of the region of origin	3.91	3.75	0.390
always safer	3.78	3.50	0.399
of more regular quality	3.65	3.33	0.363
always more expensive	3.62	3.50	0.701
always of a higher quality	3.60	3.08	0.102
always juicier	3.40	2.83	0.060
much harder to find	3.36	2.00	0.000
always tender	3.33	2.75	0.064
a source of higher incomes for their producers	3.31	3.42	0.587
always darker	3.23	2.83	0.081
I am more sensitive to PDO beef promotions	2.98	2.67	0.292
always marketed in a black package	2.97	3.09	0.769

[a] *p*-value is the significance level associated with the *t-test* for comparing differences between means assuming unequal variances.

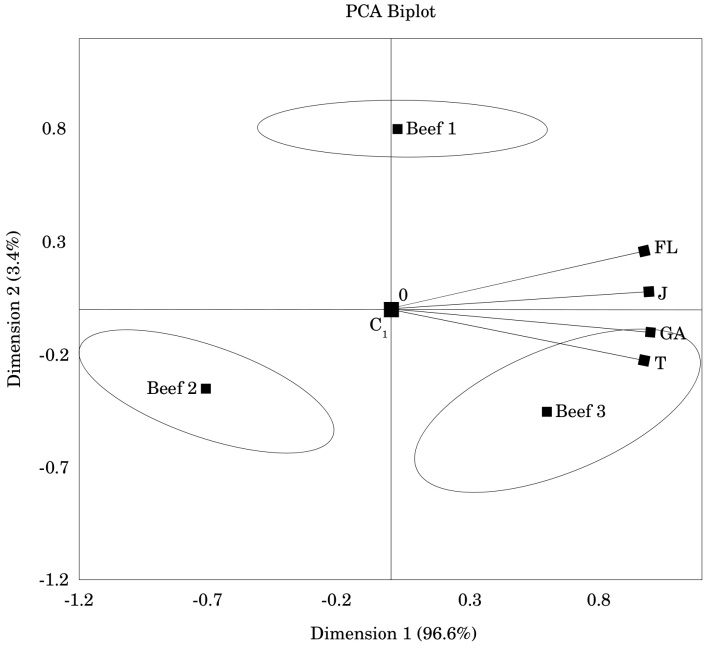
Consumers and distributors have a different perception concerning the statement *PDO beef is much harder to find* and this difference is statistically significant. This is not surprising since those distributors know perfectly well where to obtain this type of beef, while consumers find it much harder to find, as the majority of the butchers in Portugal do not sell this type of beef. Comparing the other attributes considered, it seems that distribution is more advanced in terms of marketing the product in a black package though the consumer is still not totally aware of it. Nevertheless there was not a significant difference in the values obtained. It also seems that there is always the eternal dilemma of a trade-off between *price* and *tenderness*: is it worth to invest in a tender beef though it is expected it will be more expensive to produce? Distributors rate the intrinsic attributes such as tenderness, juiciness and darkness, at a lower level, while price ranks fourth on the list.

8.3 Sensory analysis

Sensory analysis of meat, and in this case of beef, comprises many techniques applied to different food products. Sensory analysis allows for the evaluation of the organoleptic characteristics of a food product and one of its main objectives is to give to firms another tool to evaluate and choose which products should be marketed. In fact, *in industry, sensory evaluation can be used in conjunction with product developers to identify problems with a product or to optimize a number of desirable characteristics of a prototype product or in the reformulation of products caused by supply problems* (Nute, 1999). In the present work, sensory analysis was used mainly to assess if there are perceived differences in terms of *tenderness* (T), *juiciness* (J), *flavour* (FL), and *global appreciation* (GA), for three types of PDO beef, Figure 8.1.

The preliminary results obtained are presented though another sensory session will be performed to confirm these results. Nevertheless, performing *principal components analysis* (PCA) with the data obtained clearly shows the differences between the three types of beef and that *global appreciation* is highly correlated with *tenderness*, Figure 8.1.

Figure 8.1: *PCA analysis on data from sensory panel.*



These results are in accordance with other authors who argue that *tenderness* is the most important organoleptic attribute determining the degree of consumer satisfaction (Geay *et al.*, 2002; Brunsø *et al.*, 2005).

With sensory analysis we were particularly interested in assessing if tenderness allowed for some differentiation of PDO beef. The reason for that was mainly because we knew, from the consumer and distributors surveys, that *tenderness* was an important attribute for beef but PDO beef was not considered, in general, as being tenderer than undifferentiated beef.

Along with sensory analysis, distributors were asked to give their overall score in terms of *juiciness*, *tenderness*, *flavour*, *price*, and *overall appreciation* of different types of PDO beef: two PDO beefs already well established in the market and a more recently introduced PDO beef (*Beef 3* in the sensory analysis). Worth mentioning is that in terms of *tenderness* and *juiciness* the higher score was given to *Beef 3*, similar to the result obtained by sensory analysis. For the remaining attributes it is not possible to depict a distinct characterization.

In summary, sensory analysis confirms, in accordance with consumers preferences analysis and distributors perceptions, that *tenderness* is a relevant attribute differentiating beef, and defining subjective as well as objective beef quality.

8.4 Discussion and conclusion

From all the points mentioned a few major conclusions can be drawn. It should be highlighted that this paper is mainly a description of what is being done within a broader project whose ultimate goal is to give major insights into a beef quality policy for Portuguese market players.

Clearly within Portuguese beef consumers there still seems to exist a large proportion that is not aware of what *PDO* label is[7]. In fact, as previously mentioned, 58% of the respondents do not know if they have consumed *PDO* beef, and of those who have consumed (42%) a large share cannot mention any type of *PDO* beef (and 34% can only mention one). Hence, if market players want to make the most of such beef differentiation a marketing strategy based on translating what's on such a beef and what it is, is required. We can find here an important consideration for market players, as it seems that *PDO* is not capable of making the most in terms of improving considerably the awareness of the product or of influencing repeat purchases.

The most important attributes in consumers buying decisions are *taste*, *health*, and *appearance*. Therefore attention must be paid to these quality attributes by the market players. Also worth mentioning is that respondents differentiated such attributes and group them in three distinct factors: *taste & health*, *convenience*, and *price*. Consequently, consumers will weight differently these scores, accordingly, for example, with their behaviour in terms of more convenience orientated or more price-conscious. Perceived attributes, consumers' attitudes and socio-economic characteristics, will allow for, at a further stage of the research, identifying different groups of consumers, inferring eventual market segmentation.

Concerning *PDO* beef there is the widespread view that it is associated with a safer, more regular and higher quality beef, though for a significant proportion this is so at a higher price. Are consumers prepared to pay for such higher price? This is a question for further research that is already going on. It is also widely accepted that *PDO* beef is a guarantee of the genuineness of the product and that it promotes a higher development of the region of origin. But consumers use as most important factors in their buying decisions the attributes taste, health and appearance. Therefore market players, in order to increase their competitiveness in the Portuguese beef market, and concerning *PDO* beef, should make the most advantage of associating *PDO* beef with a tastier and safer product, in their communication strategy.

Another important aspect is that it can be expected that distributors do know what the market wants since, on average, there are no significant differences in the scores given by distributors and consumers to different attributes for beef in general, and for *PDO* beef in particular. Some exceptions do exist, particularly concerning the importance of price where the distributors' opinion is probably more realistic. One can then infer that price still weights considerably in beef buying decisions. The direct consequence is that the market for *PDO* beef will remain a niche market. Nevertheless these results should be complemented with a *cluster analysis*.

Worth mentioning is also the relevance of the attribute *tenderness*. Clearly this is one of the most important beef attributes for both consumers and distributors. However, *PDO* beef was not considered by the respondents, at both levels of the chain as more tender. On the other hand, sensory analysis confirms that it is possible to differentiate *PDO* beef based on this attribute. Hence, an effort should be made at improving this intrinsic attribute of *PDO* beef.

[7]The sample used reflects this and though a biased sample we expect the bias is towards overweight the proportion of respondents with such knowledge.

In order to find major sources of beef differentiation a deep knowledge of consumer perceptions, attitudes and preferences is required. A true understanding of the market is needed and if market players have this knowledge, then one step is done to become market oriented and develop strategies that can bring them a sustainable competitive advantage. Using a sample of Portuguese consumers, factor and cluster analyses were performed. The sample was segmented in terms of beef quality evaluation and PDO beef perception, where beef was positioned differently and mainly based on the different attributes. The obtained segments are significantly different. We confirm that attributes matter in beef differentiation. PDO beef producers must be aware of the need to improve the intrinsic quality of their beef produced and marketed.

9

Let's talk about attributes. Do they matter in beef differentiation?[1]

9.1 Introduction

The last *common agricultural policy* (*CAP*) reform (2003) has just started to be put into force and a major consequence is the need for farmers to be more market oriented. This is so across all the different agricultural productions, namely beef production. Nevertheless, other forces also contribute for this need of market-oriented behaviour. Recently, the beef sector has struggled to be competitive and to keep in business, particularly due to the several scares that took place, namely the *BSE* and the *foot-and-mouth* disease, but also due to the fierce competition from major substitutes, like pig and poultry meat and, in the Portuguese market, also from fish.

Market players have, therefore, been under pressure and will keep being so. The markets are highly dynamic and differentiation is becoming a pre-requisite coupled with a competitive price. So, who are those capable to keep in business? A straightforward answer will be those who have a clear understanding of the market in which they operate.

Beef consumption in the European Union (EU) and in Portugal was, in 2002, 19.8 kg and 16.8 kg *per capita*, respectively. Looking to the overall period 1990-2001, beef *per capita* consumption decreased by 19% in the EU, while consumption of poultry and pork has increased by 26% and 9%, respectively (Banović *et al.*, 2004), Chapter 5. On the other hand, Portugal has the highest value of fish consumption in the EU with a value in 2001 of 56.5 kg *per capita*, where the EU average is around 24.8 kg *per capita*. Considering food expenditure, meat, fish and other products, account for the higher proportion of Portuguese households' food expenditure. Concerning the period 1990-2000, meat expenditure in real terms, had the highest decline (-25%) and fish the lowest (-5%) in food expenditures (Banović, Barreira & Aguiar Fontes, 2006a), Chapter 4.

[1]This chapter has been submitted for publication as: Aguiar Fontes, M., Banović, M., Lemos, J.P. & Barreira, M.M. (2009). Let's talk about attributes. Do they matter in beef differentiation?

Besides these market features, a major product feature is worth mentioning. Beef has traditionally been marketed as an undifferentiated product. Is it possible to reverse this logic in the Portuguese market? When undifferentiated products are the core business of a supplier, very often the opportunity to take advantage of the higher added value is lost (Fearne & Bates, 2000). Some studies confirm that it is possible to differentiate beef (Grunert, Bredahl & Brunsø, 2004; Resurreccion, 2003).

In order to find major sources of beef differentiation a deep knowledge of consumer perceptions, attitudes and preferences is required. In fact, a true understanding of the market is needed and if market players have this knowledge, then one step is done to become market oriented and develop strategies that can bring them a sustainable competitive advantage.

Several studies have been done on beef preferences and attitudes. Grunert (1997) did a cross-cultural study on beef quality perception based on the *total food quality model* (*TFQM*), suggesting that most important product attributes on which consumers base their beef quality evaluation are fat content and colour. Similar study was undertaken in Portugal by Banović *et al.* (2009a), who concluded that extrinsic product information, namely brand, may actually influence consumers' evaluations of intrinsic product attributes, as fat content and colour, Chapter 11. Verbeke and Viaene (1999a) have analysed beliefs, attitudes and behaviour towards fresh meat consumption in Belgium, and revealed the importance of safety related meat attributes. Later, Verbeke and Vackier (2004), also analysing the Belgian market, investigated the profiles and effects of consumer involvement in fresh meat, confirming that pleasure, symbolism and risk affect considerably meat involvement. Krystallis and Arvanitoyannis (2006) studied the concept of meat quality from the Greek consumers' perspective, concluding that meat preference, in this country, is mainly evaluated based on pleasure derived from taste, which has to be evaluated according to visual quality cues such as colour, leanness, etc. These authors also found different consumer types who evaluate meat quality differently based, namely, on labels and brand name, nutritional value and microbial or chemical safety. Vanhonacker*et al.* (2007) undertook a market segmentation in Belgium based on consumers' perceived importance and attitude toward farm animal welfare. These authors identified specific market opportunities for high welfare products associated with compatible marketing strategies.

As argued by Grunert *et al.* (1996), *when analysing consumers at the individual level, we are usually interested in explaining preferences for specific products, including questions on how certain concrete product attributes affect consumers' value perception and preferences.* The consumer has the final word in terms of food choice. Motivation to buy a particular food product will be three dimensional in the sense that is the result of the links between product characteristics, or attributes, quality dimensions and purchase motives (Grunert, 1995; Peter, Olson & Grunert, 1999; Bech *et al.*, 2001). These quality dimensions can be search, experience and credence. The attributes of a product are mainly classified as intrinsic and extrinsic (Olson & Jacoby, 1972), where intrinsic attributes refer to characteristics of the product itself like safety, convenience, nutritional value, production method; and extrinsic attributes refer, namely, to brand, price, package, sales outlet, quality management systems, or label. It is based on these attributes that consumers will infer upon the quality of the product they are evaluating. Some of these attributes are in fact cues, or pieces of information, that the consumer uses to ascertain about the quality of the product.

Verbeke and Viaene (1999a), argue that consumer attitudes towards a particular product

can be developed (or conceptualised in their words) based on the product's attributes or characteristics. But these attributes differ in importance given by different consumers.

Within the beef sector, some differentiation has already been put into practice, namely through the *Protected Designation of Origin* (*PDO*) products. Portugal is the member state with the highest number of products with such designation though, and particularly for beef, this is still a niche market accounting for something like 3% of the beef marketed in Portugal (Banović *et al.*, 2008), Chapter 7.

This article attempts to characterize and interpret the market for differentiated beef using a sample of Portuguese consumers, in order to assess the potential for such market. Hence the major objectives of the research presented here are: (i) to identify major dimensions on buying motives, on attributes evaluation of beef quality, and on the perception of *PDO* versus undifferentiated beef; (ii) to segment the sample of respondents in terms of the identified dimensions and variables on buying and consumption behaviour towards beef. The achievement of such objectives will allow shedding more light on market behaviour for differentiated beef and also on the attributes and cues that are particularly relevant on consumers buying behaviour.

9.2 Methods

In order to achieve the above mentioned objectives, a sample of Portuguese consumers was interviewed. This was a convenience sample and respondents were selected by the interviewers. On all 780 questionnaires were implemented by students from the *Instituto Superior de Agronomia* and from the *Faculdade de Medicina Veterinária*; both from *Universidade Técnica de Lisboa*, during December 2005. Each student was asked to interview the head of three households in terms of food shopping. These households had to be different in terms of income, region and household structure. Although the sample was not randomly selected, a diversity of socio-demographic characteristics was achieved, namely, age, household structure, region, level of literacy, occupation and income class. Sample characteristics, based on region, age and gender of the person interviewed are described in Table 8.1, Chapter 8.

To achieve the objectives of the study, *factor analysis* was performed on a different set of variables: (i) buying motives; (ii) beef quality attributes evaluation, and (iii) quality perception of *PDO* versus undifferentiated beef. The factors obtained together with variables on buying and consumption behaviour were used to perform *cluster analysis*. Profiling of the clusters was undertaken based on buying and consumption behaviour, socio-demographic characteristics, knowledge and perception of *PDO* beef. To measure the significance of results, one-way *ANOVA*, *cross-tabulation* with *chi-square* statistics and independent sample *t-tests* were performed.

9.3 Empirical results

The results obtained are given in parts: a first part concerning *factor analysis* and a second part concerning *cluster analysis*.

9.3.1 Factor analysis

Buying motives

Factor analysis performed on the major motives influencing fresh beef purchases (importance scores ranged from 1 = *not at all important* to 5 = *extremely important*), allowed the identification of three factors (*eigenvalues* above one) explaining 59% of total variance, Table 8.2. Respondents differentiate the above nine motives and group them in three distinct factors: ***taste & health***, ***convenience***, and ***price*** (Aguiar Fontes *et al.*, 2008), Chapter 8.

Evaluation of beef quality attributes

In order to capture respondents evaluation concerning beef quality attributes, they were asked about their level of agreement with a serious of sixteen statements such as *tenderness is highly important*, *freshness is fundamental*, or *organic beef is always safer*, *beef with intramuscular fat is always tastier*, etc., using a five-point *Likert* scale ranking from 1 = *total disagreement* to 5 = *total agreement*. Statements on *freshness*, *appearance*, and *tenderness* got the higher level of agreement. Four factors were obtained explaining 46% of total variance, Table 9.1.

Table 9.1: *Evaluation of beef quality attributes: Factor solution.*

Statement	***Factor 1***	***Factor 2***	***Factor 3***	***Factor 4***
	Beef source	***Extrinsic attributes***	***Intrinsic attributes***	***Price & quality***
I trust much more on domestic beef	***0.70***	-0.09	0.22	-0.04
Beef origin is highly important	***0.70***	0.14	0.18	-0.15
An organic beef is always safer	***0.53***	0.19	-0.09	0.15
Animal breed highly influences beef quality	***0.45***	0.08	0.34	-0.08
A certified beef is always better	***0.41***	0.37	0.16	-0.01
Expiring date is determinant in buying decision	-0.04	***0.69***	0.12	0.04
Label information is very important	0.19	***0.67***	0.12	-0.04
I do not mind to pay more for animal welfare	0.37	***0.47***	-0.02	-0.30
Appearance is highly important	0.18	***0.46***	0.45	0.04
Tenderness is highly important	-0.07	0.28	***0.66***	0.02
Freshness is fundamental	0.05	0.26	***0.56***	-0.08
Cut is highly important	0.32	0.08	***0.52***	-0.08
A beef with intramuscular fat is always tastier	0.19	-0.28	***0.51***	0.03
I am very sensitive to beef promotions	-0.14	-0.05	-0.05	***0.77***
Price is determinant in the decision of buying	-0.04	-0.03	0.06	***0.76***
Higher price is always a sign of higher quality	0.39	0.07	-0.22	***0.49***
Eigenvalue	2.15	1.81	1.80	1.57
Variance (%)	13.47	11.32	11.26	9.84
Cumulative variance (%)	13.47	24.78	36.05	45.88

Bartletts test for sphericity: $\chi^2(120)$=1616.07 (<0.001).

Kaiser-Meyer-Olkin measure of sampling adequacy: *KMO*=0.78.

Loadings were derived for each of these factors using a *Varimax rotation*, *N*=748.

These factors can be interpreted as follows:

Factor 1: The statements with the highest contribution for this factor are: *I trust much more on domestic beef*, *Beef origin is highly important*, *An organic beef is always safer*, *Animal breed highly influences beef quality*, and *A certified beef is always better*. This factor was named as ***beef source***.

Factor 2: The items that loaded most heavily on this factor: *Expiring date is determinant in buying decision*, *Label information is very important*, *I do not mind to pay more for beef that ensures animal welfare*, and *Appearance is highly important*, are, in general, highly associated with information available externally, therefore we named this factor: ***extrinsic attributes***.

Factor 3: Here the statements: *Tenderness is highly important*, *Freshness is fundamental*, *Cut is highly important*, and *A beef with intramuscular fat is always tastier* were the items that contributed the most for this factor. All of them relate to beef itself therefore, we named this factor: ***intrinsic attributes***.

Factor 4: Here are included the statements: *I am very sensitive to beef promotions*, *Price is determinant in the decision of buying*, and *Higher price is always a sign of higher quality*. This factor was named as ***price & quality***.

Quality perception of PDO beef

Respondents were asked about their perceptions concerning PDO beef when compared with undifferentiated one, giving their level of agreement with a serious of statements using a five-point *Likert* scale ranking from 1 = *total disagreement* to 5 = *total agreement*. Statements with the higher level of agreement were *PDO* beef: *is a guarantee of the product genuineness*, and *promotes a higher development of the region of origin*, with an average score of 4 and the last one was *is a source of higher income for producers*, with an average score of 3. A *factor analysis* was performed and three factors were obtained explaining 66% of total variance, Table 9.2.

Table 9.2: *Quality evaluation of PDO beef: Factor solution.*

Statement	***Factor 1***	***Factor 2***	***Factor 3***
PDO beef is...	***Credence***	***Intrinsic advantage***	***Market***
a guarantee of the product genuineness	***0.81***	0.22	0.11
promotes higher development of region of origin	***0.74***	0.04	0.27
always safer	***0.74***	0.34	0.09
offered with more regular quality	***0.71***	0.28	0.04
always tender	0.17	***0.90***	0.08
always juicier	0.24	***0.86***	0.11
of higher quality	0.50	***0.66***	0.08
much harder to find	-0.15	0.24	***0.80***
always more expensive	0.30	0.17	***0.60***
a source of higher income for producers	0.30	-0.21	***0.56***
Eigenvalue	2.81	2.35	1.43
Variance (%)	28.10	23.49	14.32
Cumulative variance (%)	28.10	58.59	65.91

Bartletts test for sphericity: $\chi^2(45)=2932.68$ (<0.001).

Kaiser-Meyer-Olkin measure of sampling adequacy: $KMO=0.84$.

Loadings were derived for each of these factors using a *Varimax rotation*, $N=753$.

These factors can be interpreted as follows:

Factor 1: The items that loaded most heavily on this factor: *guarantee of the product genuineness*, *promotes a higher development of the region of origin*, *always safer*, and *offered with more regular quality*, are highly associated with credence qualities, therefore we named this factor as ***credence***.

Factor 2: The statements with the highest contribution for this factor are: *is always tender*, *is always juicier*, and *is of higher quality*. This factor was named as ***intrinsic advantage***.

Factor 3: This is factor ***market*** as the items that loaded most heavily are: *is much harder to find*, *is always more expensive*, and *is a source of higher income for producers*.

9.3.2 Segmentation analysis

In order to undertake the segmentation analysis four groups of variables were used: (i) buying and consumption behaviour, beef appreciation and knowledge of *PDO* beef; (ii) factors obtained for buying motives; (iii) factors on perceived beef quality, and (iv) factors on perceived quality of *PDO* beef.

Buying frequency was classified as follows: 0 = does not purchase; 1 = *rarely* (i.e. *less than once a month*); 2 = *1 to 3 times a month*; 3 = *1 or more than once a week*. Consumption frequency was given as: 1 = *rarely or never*; 2 = *1 to 3 times a month*; 3 = *once a week*; 4 = *2 to 3 times a week*; 5 = *almost every day*. Level of beef appreciation varied between 1=*dislike* to 5 = *like very much*. Subjective knowledge of *PDO* meaning was classified as 1 = *yes* and 0 = *no*. For the *cluster analysis* procedure we have used standardized scores (*Z score*) for these four variables. The remaining variables (*factors*) were described in the previous Subsection 9.3.1.

The K-means *cluster analysis* technique was used to identify segments of beef consumers according to the above mentioned variables. The results show a three cluster solution, Table 9.3.

Table 9.3: *Cluster means for segmentation variables.*

	Cluster 1	***Cluster 2***	***Cluster 3***		
Variables	***Beef experts***	***Price conscious***	***Uncommitted***	***F-test***	***sig. level***
Buying and consumption behaviour					
Buying frequency	0.52	-0.23	0.30	76.63	<0.001
Consumption frequency	0.56	-0.67	0.38	187.11	<0.001
Level of appreciation	0.48	-0.48	0.23	78.50	<0.001
Knowledge of PDO	0.60	0.09	-0.72	147.14	<0.001
Buying motives					
Taste & health	0.33	-0.68	0.14	69.50	<0.001
Convenience	0.34	-0.20	-0.19	23.36	<0.001
Price	-0.07	0.29	-0.21	13.83	<0.001
Perceived beef quality					
Beef source	0.32	0.20	-0.51	51.01	<0.001
Extrinsic attributes	0.09	-0.23	0.05	6.14	0.002
Intrinsic attributes	0.31	-0.08	-0.15	15.26	<0.001
Price & quality	-0.23	0.33	-0.03	16.64	<0.001
Perceived PDO beef quality					
Credence	0.69	0.04	-0.73	183.52	<0.001
Intrinsic advantage	0.20	-0.07	-0.24	11.85	<0.001
Market	0.05	0.28	-0.27	14.84	<0.001
Respondents (n^o)	252	178	213		
Respondents (%)	39	28	33		

Method: K-means Cluster, N=643.

Cluster 1 with 39% of the sample, includes respondents that more frequently purchase and consume beef; they also have the highest appreciation level and know more frequently

what *PDO* beef means. Their main factors for buying motives are: *convenience* and *taste & health*. In terms of perceived beef quality, these segment members evaluate *beef source* and *intrinsic attributes* factors above average and below average the *price & quality* factor. When comparing *PDO* to undifferentiated beef these respondents evaluate above average the *intrinsic advantage* and particularly the *credence* factors. We named this segment as the ***beef experts***.

Cluster 2 with 28% of respondents, shows negative values for buying and consumption behaviour, appreciating beef well below average. These respondents give values below average to *taste & health* and *convenience* factors and a value above average to factor *price*. *Beef source* and *price & quality* factors are evaluated above average whilst the *extrinsic attributes* factor is below average when perceiving beef quality in general. *PDO* beef quality is mainly perceived through the *market* factor. This segment was named as ***price conscious***.

Cluster 3 with 33% of respondents, includes those that though appreciating beef and having a considerable frequency of buying and consumption, majority has no knowledge of *PDO* beef. Buying motives *price* and *convenience* are considered below average in this segment. These respondents consider below average *beef source* and *intrinsic attributes* factors when evaluating beef quality, as opposed to *Cluster 1*. They also evaluate below average all the factors on perceived quality of *PDO* beef, particularly *credence*, as expected as generally they do not know what *PDO* beef is. This segment was named as ***uncommitted***.

Profiling of the clusters

In Table 9.4 the obtained segments were cross-tabulated with a set of socio-demographic variables. Female are mainly present in *Cluster 2*, the *price conscious*. With respect to age, youngest respondents are mainly in *Cluster 3*, the *uncommitted*, while the elderly are more frequently in *price conscious* segment. Notice that this segment includes a relatively large share of respondents with low income and literacy levels. On the other hand, respondents with the highest income and literacy levels are more represented in *beef experts* segment (*Cluster 1*).

Table 9.4: *Cluster profiling: Socio-economic variables.*

	Cluster 1	***Cluster 2***	***Cluster 3***		
Variables[a]	***Beef experts***	***Price conscious***	***Uncommitted***	***Sample***	***sig. level***
Gender					
Female	70.2	80.9	78.9	76.0	0.019
Age					
<35	18.2	18.6	30.0	22.2	0.013
36-55	60.3	55.4	49.8	55.5	
>56	21.5	26.0	20.2	22.3	
mean	47.1	48.5	44.5	46.7	0.016
Literacy level					
Higher education level	48.0	36.5	31.4	27.2	0.042
Income level					
Very low	17.7	35.6	31.4	27.2	<0.001
Low	27.4	27.0	25.6	26.7	
Medium	32.7	23.6	32.4	30.0	
High	32.2	13.8	10.6	16.1	

[a] In (%).

Buying and consumption behaviour are very different between segments, Table 9.5. Approximately 61% of respondents included in *beef experts* segment buys beef at least once a week and 74% consumes beef more than twice a week. These respondents prefer more frequently unpacked beef and normally buy it at the butcher. Of these consumers, 44% reveal the highest level of beef appreciation. On the other hand, in the *price conscious* segment, only 16% of respondents buy beef at least once a week and only 13% consumes beef more than twice a week. These respondents do not appreciate beef so much as only 9% reveal the highest level of appreciation.

Table 9.5: *Cluster profiling: Buying and consumption behaviour.*

	Cluster 1	***Cluster 2***	***Cluster 3***		
Variables[a]	***Beef experts***	***Price conscious***	***Uncommitted***	***Sample***	***sig. level***
Buying frequency					
at least once a week	61.1	15.7	44.1	42.9	<0.001
Butcher					
yes	65.5	48.9	58.7	58.6	0.003
Unpacked beef					
always	57.8	50.3	50.0	53.2	0.014
Consumption frequency					
less than once a week	3.2	58.5	9.4	20.5	<0.001
once a week	23.0	28.7	31.0	27.2	
twice a week or more	73.8	12.9	59.6	52.3	
Beef appreciation					
higher level	43.7	9.0	28.6	29.1	<0.001

[a]In (%).

Consumers positioning of *PDO* beef is analysed in Table 9.6. Notice that although the statements here included were used in the factor analysis it is interesting to see how respondents within the three segments evaluate differently, and significantly, *PDO* beef quality. Statements included in factor *credence* are all evaluated above average by *beef experts* segment and below average by *uncommitted* segment. *Beef experts* respondents evaluate above average all the *intrinsic attributes* as expected since the majority of them knows what *PDO* beef is. Statements included in factor *market* are all evaluated below average by respondents in *uncommitted* segment.

Table 9.6: *Cluster profiling: PDO beef buying behaviour and perception.*

		Cluster 1	***Cluster 2***	***Cluster 3***		
Variables		***Beef experts***	***Price conscious***	***Uncommitted***	***Sample***	***sig. level***
PDO Recognition[a]	*yes*	74.2	48.9	8.5	45.4	<0.001
PDO Buying frequency[a]	*no*	32.9	51.1	79.3	53.3	<0.001
PDO Consumption[a]	*yes*	72.2	43.8	11.3	44.2	<0.001
Guarantees product genuineness	*mean*	4.4	4.0	3.5	4.0	<0.001
Promotes higher region development	*mean*	4.3	4.0	3.5	3.9	<0.001
Always safer	*mean*	4.2	3.8	3.4	3.8	<0.001
Offered with more regular quality	*mean*	4.1	3.6	3.3	3.7	<0.001
Always tender	*mean*	3.5	3.3	3.1	3.3	<0.001
Always juicier	*mean*	3.7	3.4	3.1	3.4	<0.001
Of higher quality	*mean*	3.9	3.6	3.2	3.6	<0.001
Much harder to find	*mean*	3.4	3.5	3.2	3.3	0.010
Always more expensive	*mean*	3.8	3.8	3.3	3.6	<0.001
Source of higher income for producers	*mean*	3.4	3.4	3.1	3.3	<0.001

[a]In (%).

9.4 Conclusion

Driven by the major challenges surrounding the beef market, it has become increasingly clear that beef quality attributes play a significant role in consumers buying decisions. We confirm that attributes matter in beef differentiation. The sample was segmented in terms of beef quality evaluation and *PDO* beef perception, where beef was positioned differently and mainly based on the different attributes.

In this work we have performed three *factor analyses* on: (i) buying motives; (ii) beef quality attributes evaluation, and (iii) quality perception of *PDO* versus undifferentiated beef, in order to identify major dimensions for the Portuguese beef consumers. Using these dimensions and buying and consumption behaviour characteristics, a three-segment solution was used to segment the sample of consumers. Buying motives were distinguished in three factors: *taste & health*, *convenience*, and *price*. Beef quality attributes evaluation in four dimensions: *beef source*, *extrinsic attributes*, *intrinsic attributes* and *price & quality*. Finally, *PDO* beef perception versus undifferentiated, led to 3 factors: *credence*, *intrinsic advantage* and *market*.

Consumers evaluate differently the above mentioned dimensions as confirmed by the segmentation of the sample used in *beef experts*, *price conscious* and *uncommitted* consumers.

Clusters were profiled using variables such as: socio-demographic, buying and consumption behaviour *PDO* beef buying behaviour and perception. *Beef experts*, being the ones that really know what *PDO* beef is, evaluate positively all dimensions except *price* and *price & quality* and also *market*. On the other hand, *price conscious* respondents, although generally knowing what *PDO* is, are the ones evaluating positively price factors. Worth mentioning segment 3, the *uncommitted* consumers: these, on average, have no knowledge of *PDO* beef and evaluate negatively all the dimensions. Notice that their buying decisions are mainly motivated by *taste & health*. This is a segment of young and frequent beef consumers; therefore this might constitute an important segment for marketing strategies as they can be a potential target in the future.

There are further significant differences between the segments obtained. Credence attributes of *PDO* beef are perceived very differently between the segments. *Beef experts* position these attributes well above the remaining segments. We can consider that this is explained by their higher income and literacy levels, as well as the higher knowledge of *PDO* beef, and also because they are elder. These characteristics might imply a better understanding and use of the information given by the *PDO* label, confirming that consumers rely on extrinsic signs to infer about credence attributes. Notice that respondents clearly identified a distinct dimension for intrinsic attributes, both for undifferentiated and *PDO*, these intrinsic attributes are the ones more directly linked with the experience dimension of quality, which, in turn, is the one mostly contributing for repeat purchases. Unexpectedly, though *beef experts* recognize an intrinsic advantage on *PDO* beef, the difference from the other segments is not so evident. This implies that *PDO* beef producers must be aware of the need to improve the intrinsic quality of their beef produced and marketed, but also finding a better way to communicate *PDO* beef quality to consumers, where developing a quality grading system in accordance with consumers attitudes and preferences might be a source of sustainable competitive advantage.

Part IV

Consumer Trials at the Supermarket

And now for everything you always wanted to know about
Portuguese consumers' perception of beef quality,
but were afraid to ask.

This study investigated the differences in the consumers' quality perception of national branded, national store branded, and imported store branded beef. Partial Least Squares analysis is used for modelling the quality perception process. Results show that consumers perceived national branded Carnalentejana beef, as better on all quality cues and quality aspects than the other two store branded beefs. Preference for Carnalentejana beef stayed highly consistent even after the blind test, where consumers differentiated this beef from the other two beef brands on all sensory dimensions: taste, tenderness, and juiciness, and chose it as the preferred one. Consumers utilised more perceived intrinsic cues to infer expected eating quality of store branded beefs.

10

Consumers' quality perception of national branded, national store branded, and imported store branded beef[1]

10.1 Introduction

Consumers' perceptions about product quality may be based on origin, physical characteristics of the product, communication around the product, or combination of these (Steenkamp, 1990). In the shop, consumers assess quality of a product by making product evaluations based on the available intrinsic and extrinsic cues they believe reflect product quality. Of all the cues consumers are exposed to, only those which are perceived and used will influence the expected quality and thus product evaluation (Grunert, 1997). After product purchasing and following its preparation, product quality is experienced during its consumption, hence confirming or disconfirming quality expectations, and determining final satisfaction with the product and intention of repeat purchase (Grunert *et al.*, 1996).

Among quality cues, brand has been found to be one of the most important indicators of product quality, where consumers select brand names more often than other cues to infer product quality (Dodds, Monroe & Grewal, 1991; Bredahl, 2003). However, it has been found that national brands (i.e. manufacturer brands nationally known and identified as being the product of a single firm or manufacturer) have much more positive impact on the product quality perception than store brands (i.e. brands related to specific store and not to the manufacturer). Richardson, Dick and Jain (1994) found that consumers' quality perceptions of store brand grocery products were much higher when the store brand products were repacked and presented as national brands. Additionally, consumer quality perceptions were considerably lower when the national brand products were presented as store brands.

[1]This chapter has been published as: Banović, M., Grunert, K.G., Barreira, M.M. & Aguiar Fontes, M. (2010). Consumers' quality perception of national branded, national store branded, and imported store branded beef. *Meat Science*, *84*, 54-65.

Bellizzi *et al.* (1981), and Cunningham, Hardy and Imperia (1982) found that national brands are considered as more superior than private label store brands on attributes mostly related to product quality, attractiveness, taste, and labelling. Juhl *et al.* (2006) also found that store brands are in an unfavourable position compared to national brands independent of category and retail chain brand assortment strategy. Brand assortment strategy here refers to a retail chain's plan dealing with store and national brands[2]. Thus, store brands appear to be affected by unfavourable consumers' perceptions (Cardello, 1997); these of course may differ between countries and stores (Guerrero *et al.*, 2000). Reasons for these unfavourable perceptions of store brands in comparison to national brands may be due to the inexpensive package, absence of an attractive brand image, but also due to the poor communications leading to weak/unknown brand image (Richardson, Dick & Jain, 1994). Hence, consumers' quality perceptions may also be influenced by prior experience or knowledge of a particular brand, rather than specific information contained on the label. Bredahl (2003) found that brand-related experience (i.e. past purchases of a particular brand) may influence perceived product quality and future product purchases, where brand overrides the influence of other product information. Likewise, Juhl *et al.* (2006) showed that there exists quite a big difference in the consumers' ability to retrieve from the memory store brands compared to the most well-known national brands. Consequently, they pointed out that one of the indicators of success and competitive position of a national brand lays in the consumers' knowledge and ability to recall of this brand.

Recently, national and store branding of fresh beef has emerged as a key weapon in the battle waged between manufacturers and retailers for consumer loyalty, and branding has been found to positively influence consumers' expectations of beef quality (Bredahl, 2003). More and more, retailers of fresh beef are promoting their own brands aiming to differentiate a chain from other retailers and improve the quality image of their label. However, having in mind consumers' unfavourable perceptions of store brands this seems a difficult job.

Despite this fact and the considerable research in the consumer area on the different influence of national and store brands on product quality, this kind of research has not been undertaken in the case of fresh beef. Furthermore, even though consumers face more than one possibility when purchasing beef, most of the beef studies consider quality perceptions of one product only and not in comparison to other available products and brands (Bredahl, 2003). Also, studies are usually conducted in controlled settings (Brunsø *et al.*, 2005) and not with respect to real purchase environment (Acebrón & Dopico, 2000).

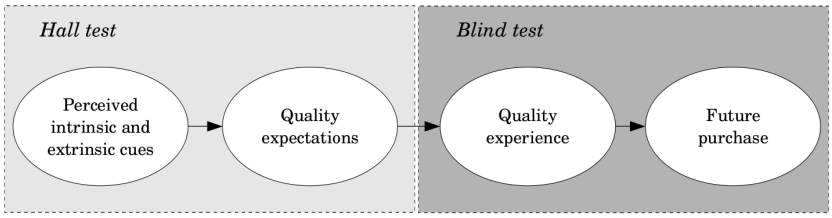
Studying consumer behaviour at the point of purchase has the advantage of shedding more light on how consumers utilise and evaluate available cues across products and brands, and enhances the external validity of the results. On the other hand, capturing real consumer behaviour at the consumption situation using in home tests, even though it increases the external validity of the results, carries also some shortcomings. For example, beef is consumed with other products, only one product can be tasted at the time, other family members might influence tasting of the product - the family halo effect, and there is a lack of control over the cooking procedures (Dransfield *et al.*, 2000; Wood *et al.*, 1995). Thus, capturing consumer behaviour at the consumption situation using *blind test* overcomes these handicaps. With regard to beef, the cattle breed type and production system should be considered, as they were found to influence

[2]That is, a retail chain can use many different names for their store brands without any link to the name of the retail chain, or they may choose very few names and maybe only one name for the store brands, making it easier for the consumer to distinguish between store and national brands.

beef quality attributes like taste, juiciness, and tenderness (Oliver *et al.*, 2006).

The aim of this study was to provide more information about consumers' quality perception of national branded, national store branded, and imported store branded beef both before and after beef consumption at the purchase point, using a simplified framework of the *total food quality model* (*TFQM*) of Grunert *et al.* (1996) and reported in Figure 10.1. The main objectives were: (i) to evaluate differences in the consumers' perceptions of quality cues and perceived beef quality between three differently branded beefs; (ii) to analyse, for each beef, relationships between perceived quality cues, expected quality, experienced quality, and future purchase intention, and (iii) to measure whether these relationships differ between three differently branded beefs. The study also explored the breed type and production method of each of the programs evaluated.

Figure 10.1: *Framework for the analysis.*



10.2 Methodology

10.2.1 Beef selection

Beef steaks from three different production systems and branded differently were selected. Beef steaks from *strip loin* muscle were harvested from carcasses of steers of two cattle breed-types from Portugal, and one imported from Brazil. The selection of the commercial carcasses for this trial was conducted by the supermarket butcher's division, and over six days of the trial two carcasses per each breed type (thirty-six carcasses in total) have been used.

One of the Portuguese breeds was produced in the region of *Alentejo*: the *Alentejana* breed. *Alentejana* breed is an indigenous purebred raised in a traditional production system (i.e. includes inherent natural and human factors, such as climate, soil quality, and local expertise). Steers of *Alentejana* breed are reared in extensive grazing systems based on natural pastures, with a finishing period on concentrate feeds during 30 days. Steers are slaughtered at 13-30 months (carcass weight ± 180kg).

The other Portuguese breed was a cross-breed from the exotic cattle breed *Charolais* and local cattle breed *Mertolenga*, commonly used for production of meat in Portugal, here referred to as *National* beef. Steers from this cross-breed are reared intensively and fattened on concentrate and cereal straw *ad libitum*. Steers are slaughtered at 12-16 months (carcass weight ± 300kg).

Finally, the other beef available was an imported one, from Brazil, a cross-breed between *Nelore* and *Angus* cattle breed, commonly used for production of meat in Brazil, here referred to as *Brazilian* beef. Steers from this cross-breed are extensively reared with diet based on pasture, silage (corn, sorgus), sugar cane, and soybean bran. Steers are slaughtered at 17-24 months (carcass weight ± 400kg).

These beefs are marketed differently. Due to its typical production, products of breed-*Alentejana* are registered by the national brand name *Carnalentejana*, and the other two types, *National* and *Brazilian* beef, are marketed under the store brand name of the supermarket chain. The supermarkets' butcher department was in charge of collecting, cutting and packaging of the beef steaks. For each day of the trail, over six days, beef steaks were all freshly cut in the same way and from the same part of selected carcasses, i.e. *strip loin* muscle. The *strip loin* muscle was cut into chops 1.5 cm - thick. From the prepared chops, three beef steaks were randomly selected for later *blind test*, while other beef steaks were packed for sale. Beef steaks for sale were displayed in the usual locations in the retail counter, where the consumers are expecting to find them. All three beef types were different in terms of appearance, label information, package, and price, Table 10.1.

Table 10.1: *The visual appearance, label information and package of three beef brands.*

	Carnalentejana beef	***National beef***	***Brazilian beef***
Visual appearance			
Colour			
Dark red	✓	x	x
Medium red	x	x	✓
Light red	x	✓	x
Intramuscular fat content			
High	✓	x	x
Medium	x	x	✓
Low	x	✓	x
Fat trim			
Yes	✓	✓	x
No	x	x	✓
Label information			
Product type	✓	✓	✓
Animal identification	✓	✓	✓
Slaughterhouse & permit code (animal slaughtered)	✓	✓	x
Slaughterhouse & permit code (carcass dismembered)	✓	✓	x
Animal born (country of origin)	✓	✓	x
Animal raised (country of origin)	✓	✓	x
Country of origin	✓	✓	✓
End by date	✓	✓	✓
Weight	✓	✓	✓
Price per kilo			
14.95€/kg	x	x	✓
18.90€/kg	x	✓	x
22.95€/kg	✓	x	x
Additional information			
National brand name	✓	x	x
Store brand name	x	✓	✓
Information on production system	✓	x	x
Package			
Conventional plastic trays	✓	✓	✓
Colour			
Black	✓	x	x
White	x	✓	x
Yellow	x	x	✓

✓ → available; x → not available.

Selected beef steaks for *blind-tasting* were cut in 5-6 portions. The supermarket's butcher department was likewise in charge of preparing and cutting the beef steaks for the *blind test* to ensure that these were all cut in the same way. The portion of beef steak for tasting, for all three samples, was from the same place in all slices of the beef steaks. Beef steaks for tasting were stored in cooling conditions until grilling (4℃). The preparation of beef steaks for tasting

took place at the supermarket with an electric contact grill by a professional cook. Beef steaks were grilled at the preheated grill at 200℃, until medium degree of doneness, without any salt or spices, and in front of the respondent.

10.2.2 Questionnaire

The questionnaire consisted of two parts, including mainly closed questions with constructs based on the previous research on beef quality perception (Aguiar Fontes *et al.*, 2008; Grunert, Bredahl & Brunsø, 2004; Verbeke & Ward, 2006), Section 2.4, Table 2.3 and Chapters 8 and 9.

The first part covered consumers' usage of quality cues and evaluation of beef quality in the real purchase environment (*hall test* at the supermarket); the second one covered consumers' evaluation of beef eating quality (*blind test* at the supermarket), and consumers' socio-economic characteristics. Hence, the first part composed three sections: (i) perceived extrinsic and intrinsic quality cues; (ii) evaluation of expected quality, and (iii) buying and consuming behaviour. Each perceived intrinsic cue, extrinsic cue, and quality expectation was measured for the three types of beef steaks on a seven-point evaluative scale, Table 10.2.

Table 10.2: *Selected variables and scales.*

Variable	***Scale endpoints***	
Perceived quality cues[a]		
Colour	1 - Absolutely dislike	7 - Absolutely like
Fat	1 - Absolutely dislike	7 - Absolutely like
Cut	1 - Absolutely dislike	7 - Absolutely like
Brand	1 - Absolutely dislike	7 - Absolutely like
Country of origin	1 - Absolutely dislike	7 - Absolutely like
Label information	1 - Absolutely dislike	7 - Absolutely like
Package	1 - Absolutely dislike	7 - Absolutely like
Price	1 - Not at all expensive	7 - Extremely expensive
Expected quality[b]		
Taste	1 - Not at all tasty	7 - Extremely tasty
Tenderness	1 - Not at all tender	7 - Extremely tender
Juiciness	1 - Not at all juicy	7 - Extremely juicy
Healthiness	1 - Not at all healthy	7 - Extremely healthy
Nutrition	1 - Not at all nutritious	7 - Extremely nutritious
Safety	1 - Not at all safe	7 - Extremely safe
Experienced quality[c]		
Taste	1 - Not at all tasty	7 - Extremely tasty
Tenderness	1 - Not at all tender	7 - Extremely tender
Juiciness	1 - Not at all juicy	7 - Extremely juicy
Healthiness	1 - Not at all healthy	7 - Extremely healthy
Nutrition	1 - Not at all nutritious	7 - Extremely nutritious
Safety	1 - Not at all safe	7 - Extremely safe
Future purchase intention[d]	1 - Definitely will not buy	7 - Definitely will buy

[a]Perceived quality cues → *hall test.*

[b]Expected quality → *hall test.*

[c]Experienced quality → *blind test.*

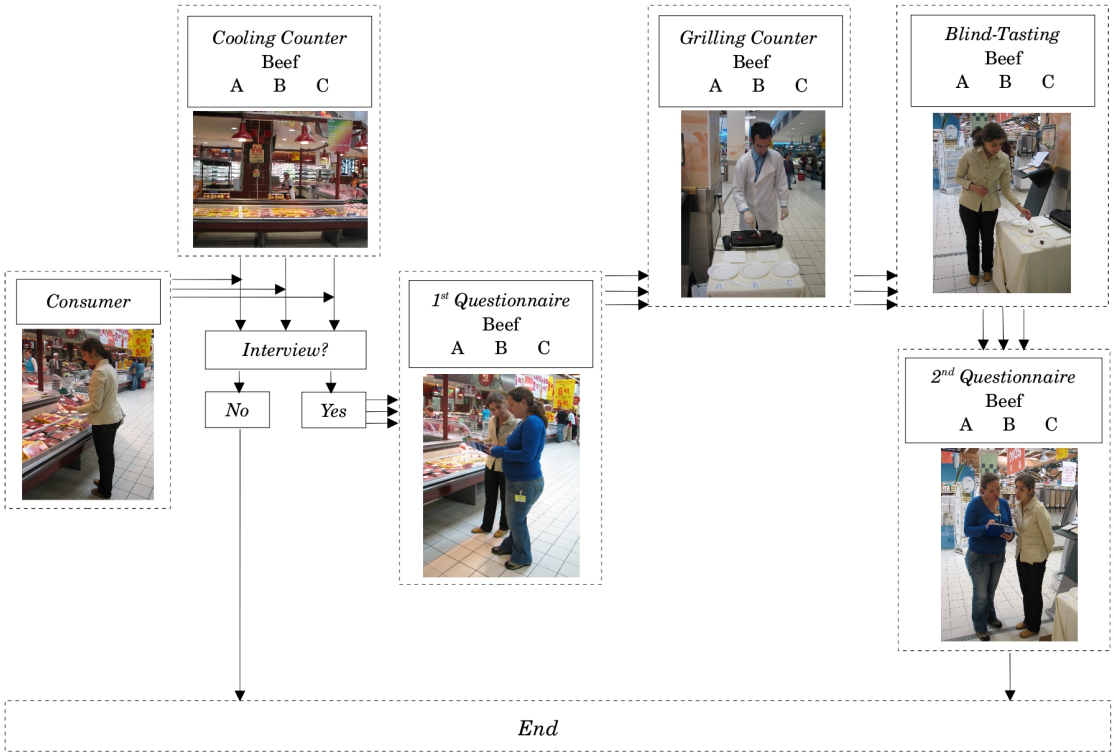
[d]Future purchase intention → *blind test.*

The second part of the questionnaire composed four sections: (i) evaluation of the experienced quality; (ii) intention of future purchase; (iii) preferred beef, and (iv) socio-economic characteristics. Experienced quality and future purchase of the three beef types were also measured on a seven-point evaluative scale, Table 10.2.

10.2.3 Data collection

Data collection was conducted in the Portuguese region of *Lisboa e Vale do Tejo*, at a supermarket, which was chosen based on the following criteria: (i) branded beef is mainly marketed through these type of retailers; (ii) this supermarket was located in a Portuguese district that covers households with different income and literacy levels; (iii) the research team was told that this was a supermarket where the type of beef steaks under study was bought regularly, and (iv) the logistics of the study could be better implemented in this particular supermarket since it had a convenient area and design, see Figure 10.2.

Figure 10.2: *Research design.*



A → *Carnalentejana* beef; B → *Brazilian* beef; C → *National* beef.

The present research was conducted using the combination of a real-life setting with all available stimuli, a supermarket, i.e. *hall test*, and a controlled setting, i.e. *blind test*. The real-life setting was considered being more suitable for understanding of how consumers evaluate quality cues and perceive beef quality in every day purchase, and across different types/brands of beef.

On the other hand, a *blind test* is thought to forestall conscious as well as subconscious bias in the experience phase, as consumers have no idea of the beef types/brands being tested. For example, in the open tasting tests when comparing different brands, consumers will be more likely to choose and consider beef they usually buy as superior. In the *blind test*, this influence is anticipated, given that beefs' identities are concealed, thus consumers may prefer a different beef.

The research design depicted in Figure 10.2 was implemented over six days during spring

2007. Consumers were approached as soon as they had chosen (from the cooling counter) one of the beef steaks under study and put it in their shopping trolley. Only full questionnaires with valid answers were kept. Finally, from 156 consumers approached, 100 complete questionnaires were obtained per each type of beef.

10.2.4 Data analysis

Data analysis presented here involved three main steps:

First, the statistical validation of the differences in the consumers' perceptions of three beef brands, regarding quality cues, expected and experienced quality, and intention for future purchase was assessed through *F-test*, and *Post-hoc tests* (*Tukey and Dunnett's test*).

Second, in order to examine hypothesised relationships between perceived quality cues, expected quality, experienced quality, and future purchase intention, Figure 10.1, *principal component analysis* (*PCA*) (using SPSS 15.0, *Varimax* rotation with *Kaiser* normalisation) and *reliability analysis* (*Cronbach's alpha*) followed by *partial least squares* (*PLS*) were conducted for each beef separately (Table 10.3).

Table 10.3: *Measures for the evaluation of PLS model.*

Criterion	***Rule of thumb***	***Description***
Evaluation of measurement model quality		
Factor loadings	$\geq$0.07	Convergent validity
Average variance extracted (*AVE*)	$\geq$0.05	Convergent and discriminant validity
Square root *AVE*	> than correlations among latent constructs	Discriminant validity
Composite reliability (*CR*)	$\geq$0.07	Convergent validity
Cross-validated communality (*CVC*) index	>0	Observed values well reconstructed and model has a predictive relevance; index assessed by *blindfolding* method (Wold, 1985).
Evaluation of structural model quality		
R^2	0.67 → substantial 0.33 → moderate 0.19 → weak	Power of the relations among different latent constructs (Chin, 1998).
Standardised path estimates	→ should be significant at 0.1, 0.05 or 0.001	*t*-values computed using a *Bootstrapping* method (Hesterberg *et al.*, 2003).
Cross-validated redundancy (*CVR*) index	>0	Model has a predictive relevance; index assessed by *blindfolding* method (Wold, 1985).
Global criterion of goodness-of-fit (GOF)		
Absolute *GOF* Relative *GOF*	→ closer to 1 better the fit	Absolute *GOF* is computed as the geometric mean of the average communality and the average R^2, while the relative *GOF* is computed by dividing the absolute *GOF* value by its maximum value achievable for the analysed set (Tenenhaus *et al.*, 2005).

The *PCA* and *reliability* analyses were undertaken in order to identify underlying factors that explain the patterns within a set of observed variables, i.e. quality cues, expected and experienced quality, as well as to obtain constructs that are unidimensional (Tenenhaus *et al.*, 2005). Based on the results from the *PCA* and *reliability* analyses and using the hypothesised relationships in Figure 10.1, quality perception models for each type of beef were estimated by *PLS* using *SmartPLS 2.0* (Ringle, Wende & Will, 2005). The evaluation of model's goodness-of-

fit estimated using *PLS* is based on different authors' recommendations (Chin, 1998; Tenenhaus *et al.*, 2005; Fornell & Cha, 1994; Hair *et al.*, 2006), Table 10.3, and assessed in two steps: (i) evaluation of the measurement model quality, and (ii) evaluation of structural model quality.

Finally, in order to compute significant differences between the standardised path coefficient estimates obtained from three beef models, *t-test* was used (Chin, 2000), where estimated path coefficients were compared two by two. It is assumed that the estimated path coefficients are independently distributed and that error variance is unknown but equal.

10.3 Results

Main sample characteristics of the respondents are presented in Table 10.4. The majority of respondents were women. Respondents' age ranged from 22 to 82 years, though 40% fell in the age class 31-40. Majority of respondents were highly educated with medium to high income. This was expected since beef steaks from *strip loin* muscle are the second most expensive beef steaks in Portugal. With respect to beef purchases, the majority of respondents bought beef steaks either once a week or 2-3 times a month. Respondents claimed to consume beef steaks several times a week. In addition, this selection of consumers was in accordance with previous research undertaken on Portuguese household food expenditure (Banović, Barreira & Aguiar Fontes, 2006a), Chapter 4. According to this research women are still the primary food shopper; and households that spend higher share of total meat expenditure on beef consumption are mostly households in region of *Lisboa e Vale do Tejo*, with medium to higher income, higher literacy levels, and average age between 30-64 years.

Table 10.4: *Sample characteristics (N=100).*

Variable	***Frequency/ Mean (St.deviation)***
District	
Lisboa	62.0%
Setúbal	38.0%
Gender	
Female	66.0%
Male	34.0%
Household size	3.0 (1.3)
Number of children (<12 years)	0.5 (0.9)
Civil state	
Single	19.0%
Married	64.0%
Widow/er	3.0%
Divorced	4.0%
Other cases	10.0%
Age	
≤30	15.0%
31-40	41.0%
41-50	20.0%
≥51	24.0%
Education	
Primary school	15.0%
Secondary school	16.0%
Bachelor	5.0%
University or higher	64.0%
Household net income per month	
<1100€	14.0%
1110-1850€	21.0%
1850-3700€	37.0%
>3700€	28.0%
Beef buying frequency	
once a week	41.0%
2-3 times a month	41.0%
less than once a month	18.0%
Beef consumption frequency	
daily	6.0%
2-3 times a week	47.0%
once a week	26.0%
less than once a week	21.0%

10.3.1 Differences in consumers' perceptions of three beef brands

Table 10.5 shows the mean scores of consumers' perceptions of quality cues. As seen from Table 10.5, consumers perceived *Carnalentejana* beef as better than *National* and *Brazilian* beef on almost all intrinsic quality cues, except for cut. The fact that cut was not perceived to be different between beef brands was expected, since all the beef steaks were cut in the same way. Further, *Carnalentejana* beef was also preferred

over other two beef brands in terms of all extrinsic cues, and regarded as more expensive beef. The brand name *Carnalentejana* was preferred by consumers over the store brand names in *National* and *Brazilian* beef. Consumers perceived *National* beef, when compared to *Brazilian* beef, as more expensive, and preferred it in terms of origin and label information. There was no major distinction between these two beef brands considering intrinsic quality cues.

Table 10.5: *Quality cues*[A].

	Carnalentejana beef	***National beef***	***Brazilian beef***	***F-test (ANOVA)***	***p-value***
Colour	5.81^a	5.28^b	5.07^b	8.306	0.000
Fat	5.03^a	4.45^b	4.18^b	7.864	0.000
Cut	5.14^a	5.08^a	4.76^a	2.013	0.135
Brand	5.90^a	4.32^b	4.09^b	56.881	0.000
Country of origin	6.13^a	5.13^b	4.56^c	34.788	0.000
Price	5.94^a	5.14^b	4.04^c	53.253	0.000
Label information	5.48^a	4.99^b	4.53^c	12.440	0.000
Package	5.22^a	4.57^b	4.32^b	10.249	0.000

[A]Mean scores for three beef brands on a 7-point scale. A higher mean score indicates better appreciation of quality cues and more expensively perceived meat by the consumers (see Table 10.2).
[a,b,c]Scores in the same row with a different superscript are significantly different at $p<0.05$ (*Post-hoc Tukey* and *Dunnett's* multiple comparison tests).

Table 10.6 shows mean evaluations of expected quality aspects for three types of beef. Consumers perceived *Carnalentejana* beef as having higher expected quality than *National* and *Brazilian* beef on all quality aspects considered. Further, it seems that consumers feel safer with *National* beef than with *Brazilian* beef.

Table 10.6: *Expected quality*[A].

	Carnalentejana beef	***National beef***	***Brazilian beef***	***F-test (ANOVA)***	***p-value***
Taste	5.97^a	5.02^b	5.10^b	18.831	0.000
Tenderness	5.88^a	5.15^b	5.27^b	10.273	0.000
Juiciness	5.92^a	5.18^b	5.23^b	12.964	0.000
Nutrition	5.48^a	5.07^b	4.91^b	6.059	0.003
Healthiness	5.14^a	4.63^b	4.43^b	7.010	0.001
Safety	5.86^a	5.10^b	4.81^c	15.582	0.000

[A]Mean scores for three beef brands on a 7-point scale. A higher mean score indicates better appreciation of quality cues and more expensively perceived meat by the consumers (see Table 10.2).
[a,b,c]Scores in the same row with a different superscript are significantly different at $p<0.05$ (*Post-hoc Tukey* and *Dunnett's* multiple comparison tests).

Moreover, and as can be seen from Table 10.7, consumers considered *Carnalentejana* beef, after the *blind-tasting test*, as better than *National* and *Brazilian* beef based on the sensory dimensions taste, tenderness, and juiciness. On the other hand, consumers regarded *National* and *Brazilian* beef to be similar across these sensory dimensions.

Other quality aspects, i.e. nutrition, healthiness, and safety were perceived to be similar between the three beef brands. This was expected, since these dimensions represent credence quality aspects that consumers cannot readily evaluate in the *blind test*. Furthermore, consumers'

added that for future beef purchase, *Carnalentejana* beef would be their choice. Finally, in terms of an overall appreciation, consumers preferred *Carnalentejana* beef, over *National* and *Brazilian* beef, where 53% of respondents chose *Carnalentejana* beef.

Table 10.7: *Experienced quality and future purchase intention*[A].

	Carnalentejana beef	***National beef***	***Brazilian beef***	***F-test (ANOVA)***	***p-value***
Experienced quality					
Taste	5.43^a	4.96^b	4.91^b	6.227	0.000
Tenderness	5.66^a	4.90^b	5.19^b	8.793	0.002
Juiciness	5.51^a	5.12^b	4.91^b	5.318	0.005
Nutrition	5.12^a	4.97^a	5.01^a	0.523	0.593
Healthiness	4.83^a	4.78^a	4.73^a	0.175	0.840
Safety	5.29^a	5.26^a	5.20^a	0.194	0.824
Future purchase intention	5.73^a	4.69^b	4.69^b	12.273	0.000

[A]Mean scores for three beef brandson a 7-point scale. A higher mean score indicates better appreciation of quality cues and more expensively perceived meat by the consumers (see Table 10.2).

[a,b,c]Scores in the same row with a different superscript are significantly different at $p<0.05$ (*Post-hoc Tukey* and *Dunnett's* multiple comparison tests).

10.3.2 Relationships between perceived quality cues, expected and experienced quality, and future purchase intention for three beef brands

In order to investigate the underlying factor structure of perceived quality cues, expected and experienced quality, three *PCA* analyses were performed for each of the three beef types. The results are presented in Table 10.8.

The results from the *PCA* analysis for perceived quality cues and for each beef, Table 10.8, revealed three distinct factors. These factors can be dubbed as intrinsic, extrinsic, and price factors. The extracted factors explained a high proportion of the original variance, had *eigenvalues* over one, and yielded satisfactory *Cronbach's alphas*. A similar structure of intrinsic and extrinsic factors was obtained for both *Carnalentejana* and *National* beef. The extrinsic factor covered brand, origin, label information, and package, while the intrinsic factor included colour, fat, and cut. Similar factors' constructs were found for *Brazilian* beef. Notice that in the case of *Brazilian* beef the first factor identified was intrinsic, and not extrinsic like in the case of *Carnalentejana* and *National* beef. Another interesting element is that origin was loading on intrinsic factor in the case of *Brazilian* beef. Price was perceived as a separate factor for all three types of beef.

The second *PCA* analysis was undertaken to investigate dimensionality of the expected quality for three beef brands. Regarding expected quality and three beef types, two factors emerged, Table 10.8, an eating dimension and a health dimension. The first factor, for three beef brands, eating dimension included taste, tenderness, and juiciness. The second factor, for three beef brands, health dimension covered nutrition, healthiness, and safety. Both factors yielded high proportion of variance, *eigenvalues* values over one, and satisfactory *Cronbach's alphas*.

The results of the third *PCA* analysis on experienced quality, after the *blind-tasting test*, brought to light the same two-factor structure for the three types of beef. Again, experienced eating quality covered taste, tenderness, and juiciness, while experienced health quality covered

healthiness, nutrition, and safety, for all three types of beef. Factors obtained from the third *PCA* analysis resulted in high proportion of variance explained, *eigenvalues* over one, and when separate items combined into scales revealed satisfactory Cronbach's alphas.

Table 10.8: *Results of PCA analysis on perceived quality cues, expected and experienced quality*[a].

	Carnalentejana beef			***National beef***			***Brazilian beef***		
	Factor 1	***Factor 2***	***Factor 3***	***Factor 1***	***Factor 2***	***Factor 3***	***Factor 1***	***Factor 2***	***Factor 3***
Perceived quality cues	*Extrinsic*	*Intrinsic*	*Price*	*Extrinsic*	*Intrinsic*	*Price*	*Intrinsic*	*Extrinsic*	*Price*
Brand	0.79			0.72				0.64	
Origin	0.79			0.82			0.77		
Label info	0.71			0.73				0.69	
Package	0.63			0.58				0.78	
Colour		0.85			0.77		0.64		
Fat		0.65			0.83		0.80		
Cut		0.67			0.74		0.58		
Price			0.74			0.94			0.96
Eigenvalues	2.35	1.67	1.18	2.27	2.09	1.08	2.23	1.98	1.09
Variance explained (%)	29.33	20.90	14.71	28.43	26.11	13.46	27.90	24.75	13.58
Cronbach's α	0.73	0.61		0.74	0.74		0.73	0.64	
BT^b		164.39			205.37			171.92	
KMO^c		0.64			0.77			0.71	
Total variance (%)		64.95			68.00			66.23	
Expected quality	*Eating quality*	*Health quality*		*Eating quality*	*Health quality*		*Eating quality*	*Health quality*	
Taste	0.85			0.89			0.87		
Tenderness	0.82			0.83			0.90		
Juiciness	0.84			0.89			0.90		
Healthiness		0.89			0.87			0.89	
Nutrition		0.82			0.84			0.88	
Safety		0.67			0.62			0.70	
Eigenvalues	2.29	2.03		2.65	2.13		2.59	2.15	
Variance explained (%)	38.14	33.76		44.26	35.50		43.14	35.83	
Cronbach's α	0.82	0.77		0.90	0.83		0.90	0.81	
BT^b		220.22			354.61			312.22	
KMO^c		0.74			0.87			0.78	
Total variance (%)		71.91			79.76			78.97	
Experienced quality	*Eating quality*	*Health quality*		*Eating quality*	*Health quality*		*Eating quality*	*Health quality*	
Taste	0.76			0.82			0.88		
Tenderness	0.88			0.90			0.84		
Juiciness	0.84			0.87			0.84		
Healthiness		0.86			0.90			0.87	
Nutrition		0.85			0.80			0.89	
Safety		0.77			0.74			0.75	
Eigenvalues	2.12	2.12		2.35	2.09		2.35	2.21	
Variance explained (%)	35.35	35.35		39.08	34.86		39.18	36.77	
Cronbach's α	0.79	0.79		0.85	0.78		0.85	0.82	
BT^b		202.45			246.95			267.33	
KMO^c		0.72			0.73			0.74	
Total variance (%)		70.69			73.94			75.95	

[a] *Varimax* rotated solution. Factor loadings <0.50 excluded.

[b] *Bartlett's test of sphericity* (all significant at $p<0.001$).

[c] *Kaiser-Meyer-Olkin measure of sampling adequacy.*

Based on the findings from *PCA* analyses on perceived quality cues, expected and experienced quality (for each beef), Table 10.8, and hypothesised relationships in Figure 10.1, the relationships between perceived quality cues, expected quality, experienced quality, and future purchase intention for each beef investigated, i.e. *Carnalentejana*, *National*, and *Brazilian*, was estimated using *PLS* path modelling.

Table 10.9 provides standardised factor loadings for each item and their corresponding reliabilities, as well as the goodness of fit measures for the measurement model for each beef type. Overall, when observing the quality of the measurement model for each beef, they support the validity of the latent constructs included in the quality perception model for each beef. That is, factor loadings are above 0.7 and corresponding reliabilities above 0.5. All *AVE* values are higher than the suggested cut off level of 0.5, and each construct square root *AVE* is larger than its correlations with the other constructs. *Composite reliability* (*CR*) is greater than the recommended level of 0.7 for all constructs. Finally, all three models exhibit positive *CV-communality* (*CVC*) showing that the observed variables are well reconstructed and that measurement model has a good predictive relevance.

Table 10.10 shows standardised path estimates of the structural model for each beef, as well as the corresponding goodness of fit measures. The quality of the structural model is initially observed by the R^2, measuring the explanatory power of the relations between the different constructs. Results show that in all three models, the best explained endogenous construct is future purchase, followed by expected eating quality, while the other constructs are explained moderately to weak. The less explained of all constructs and for all beef is experienced eating quality, as expected. This finding is in line with previous research on the matter (Brunsø *et al.*, 2005). Moreover, all three models exhibit positive *CV-redundancy* (*CVR*) and confirm good fit of the models. Finally, absolute and relative criterion of *goodness-of-fit* (*GOF*) are also computed for the structural models showing the satisfactory fit of the three models.

When observing the structural model, and estimated path coefficients, Table 10.10, some interesting matters emerge. Consumers seem to utilise perceived intrinsic cues more in order to infer expected eating quality of *Brazilian* and *National* beef. On the other hand, for *Carnalentejana* beef, consumers use perceived extrinsic cues with quite similar weight, as perceived intrinsic cues. When forming eating quality expectations of *Brazilian* beef, consumers utilise perceived extrinsic cues with much lower weight than perceived intrinsic cues. Further, consumers form health quality expectations using more perceived extrinsic cues than perceived intrinsic cues. Consumers perceived price as unimportant factor for quality evaluation of both *Carnalentejana* and *Brazilian* beef. However, in the case of *National* beef, consumers regarded price as predictive of expected eating quality. Moreover, in this case, the relationship between perceived price and expected eating quality is positive (i.e. higher price linked to a higher eating quality expectation), what implies that consumers use price as a quality cue.

Generally, Table 10.10, the relationship between expected and experienced quality is stronger between expected and experienced health quality, than between expected and experienced eating quality. In addition, explained variance of experienced eating quality is very weak in all structural models. Further, and for three beef brands, experienced health quality is reasonably well explained by expected health quality and experienced eating quality. Finally, future purchase, for three beef brands, is highly influenced by experienced eating quality. These findings are very much in accordance with other studies in this field (Bredahl, 2003; Brunsø *et al.*, 2005).

Table 10.9: *Measurement models.*

Relationship	*Carnalentejana beef*		*National beef*		*Brazilian beef*	
	Standardised factor loadings	***Item reliabilities***	***Standardised factor loadings***	***Item reliabilities***	***Standardised factor loadings***	***Item reliabilities***
Perceived extrinsic cues						
Brand	0.83	0.70	0.83	0.69	0.90	0.81
Origin	0.77	0.60	0.79	0.63	-	-
Label info	0.79	0.62	0.67	0.45	0.71	0.50
Package	0.58	0.33	0.69	0.48	0.64	0.41
CR	0.83		0.84		0.80	
AVE	0.56		0.56		0.57	
CVC	0.26		0.27		0.20	
Perceived intrinsic cues						
Colour	0.85	0.72	0.88	0.77	0.81	0.65
Fat	0.76	0.58	0.72	0.52	0.68	0.46
Cut	0.62	0.38	0.82	0.68	0.74	0.55
Origin[a]					0.74	0.55
CR	0.79		0.85		0.83	
AVE	0.56		0.65		0.55	
CVC	0.16		0.31		0.26	
Perceived price						
Price	1.00	1.00	1.00	1.00	1.00	1.00
CR	1.00		1.00		1.00	
AVE	1.00		1.00		1.00	
CVC	-		-		-	
Expected eating quality						
Taste	0.88	0.77	0.92	0.85	0.91	0.83
Tenderness	0.87	0.75	0.91	0.83	0.92	0.84
Juiciness	0.83	0.69	0.90	0.81	0.90	0.82
CR	0.89		0.94		0.94	
AVE	0.74		0.83		0.83	
CVC	0.46		0.62		0.62	
Expected health quality						
Health	0.85	0.72	0.87	0.75	0.87	0.75
Nutrition	0.82	0.68	0.84	0.71	0.83	0.69
Safety	0.80	0.64	0.87	0.76	0.85	0.73
CR	0.86		0.90		0.89	
AVE	0.68		0.74		0.73	
CVC	0.35		0.46		0.43	
Experienced eating quality						
Taste	0.82	0.68	0.85	0.72	0.87	0.76
Tenderness	0.86	0.74	0.89	0.80	0.86	0.74
Juiciness	0.83	0.69	0.90	0.81	0.89	0.80
CR	0.88		0.91		0.91	
AVE	0.70		0.87		0.77	
CVC	0.39		0.52		0.51	
Experienced health quality						
Health	0.89	0.80	0.87	0.76	0.91	0.83
Nutrition	0.83	0.69	0.80	0.65	0.82	0.67
Safety	0.79	0.72	0.82	0.67	0.84	0.71
CR	0.88		0.87		0.89	
AVE	0.70		0.69		0.73	
CVC	0.40		0.37		0.45	
Future purchase						
Intention to buy	1.00	1.00	1.00	1.00	1.00	1.00
CR	1.00		1.00		1.00	
AVE	1.00		1.00		1.00	
CVC	-		-		-	

All significant at $p<0.05$; [a]Origin was considered as intrinsic cue only for *Brazilian* beef.

AVE-Average variance extracted; *CR-Composite reliability*; *CVC-Cross-validated communality* → *Blindfolding* results.

Table 10.10: *Structural models: Standardised path estimates, multiple-group comparison of the standardised path estimates, and goodness-of-fit measures.*

	Standardised path estimates			***t-test (t-value)***		
Relationship	***Carnalentejana beef***	***National beef***	***Brazilian beef***	***C↔N***	***C↔B***	***N↔B***
Expected eating quality						
Perceived extrinsic cues	0.37****	0.31****	0.19**	0.53	2.02**	1.07
Perceived intrinsic cues	0.38****	0.48****	0.59****	-1.09	-2.11**	-1.04
Perceived price	0.13	0.14*	-0.02	0.08	1.35	1.87*
R^2	0.33	0.51	0.50			
CVR	0.17	0.38	0.39			
Expected health quality						
Perceived extrinsic cues	0.33****	0.31***	0.32***	0.09	0.06	-0.63
Perceived intrinsic cues	0.20***	0.25**	0.25**	-0.39	-0.37	0.00
Perceived price	0.09	0.12	0.01	-0.21	0.60	1.11
R^2	0.20	0.27	0.25			
CVR	0.09	0.14	0.12			
Experienced eating quality						
Expected eating quality	0.17**	0.25**	0.35***	-0.51	-1.27	-0.59
R^2	0.03	0.06	0.12			
CVR	0.01	0.04	0.09			
Experienced health quality						
Expected health quality	0.22**	0.33****	0.47****	-0.74	-1.84*	-1.10
Experienced eating quality	0.33****	0.36****	0.28***	-0.24	0.42	0.59
R^2	0.17	0.25	0.37			
CVR	0.11	0.17	0.26			
Future purchase intention						
Experienced eating quality	0.65****	0.62****	0.79****	0.30	-1.95*	-1.91*
Experienced health quality	-0.02	-0.11	-0.12	-1.05	-1.16	-0.10
R^2	0.42	0.39	0.56			
CVR	0.40	0.37	0.55			
GOF-absolute	0.40	0.47	0.51			
GOF-relative	0.74	0.85	0.88			

*$p<0.1$; **$p<0.05$; ***$p<0.01$; ****$p<0.001$.

A → *Carnalentejana* beef; B → *Brazilian* beef; C → *National* beef.

CVR-Cross-validated redundancy → *Blindfolding* results.

10.3.3 Comparison of structural relationships

In order to observe differences in the structural relationships, standardised path coefficients were compared two by two between the three beef models using the *t-test*, Table 10.10. As seen from Table 10.10 results show differences between six path estimates.

The influence of perceived intrinsic cues on expected eating quality is significantly different between *Carnalentejana* and *Brazilian* beef. Perceived attractiveness of intrinsic cues has much higher influence on expected eating quality of *Brazilian* beef than of *Carnalentejana* beef. Another significant difference was also observed between *Carnalentejana* and *Brazilian* beef, but now in the relation between perceived extrinsic cues and expected eating quality. In this case, the influence of perceived extrinsic cues on expected eating quality was higher for *Carnalentejana* beef than it was for *Brazilian* beef. Further, results show that the influence of perceived price on expected eating quality significantly differs between *National* and *Brazilian* beef. However, consumers considered price as an important factor for forming eating quality expectations only in the case of *National* beef. A further significant difference was observed between *Carnalentejana* and *Brazilian* beef for the relationship expected health quality experienced health quality. This relationship is stronger for *Brazilian* beef.

Finally, results show that *Brazilian* beef differs from both *Carnalentejana* and *National* beef in the relationship between experienced eating quality and future purchase. This is in such a way that the influence of experienced eating quality on future purchase is much more distinct in the case of *Brazilian* beef.

10.4 Discussion and conclusion

This study analysed quality perception of a particular beef product, i.e. beef steaks from *strip loin* muscle and from the three differently branded beefs and provides a comprehensive insight of the consumers' beef quality perception process, both at the purchase point, and after beef consumption, regarding Portuguese consumers. The results from this study are very much in accordance with findings from similar studies (Grunert, 1997; Acebrón & Dopico, 2000; Bredahl, 2003; Brunsø *et al.*, 2005).

At the point of purchase, consumers preferred beef steaks from national branded *Carnalentejana* beef on all quality cues and quality aspects, over the other two store branded beefs. The fact that *Carnalentejana* beef was perceived as better than *National* and *Brazilian* beef on all quality cues and quality aspects might suggest that consumers actually find information about the way this beef is produced (e.g. autochthonous breed; traditional methods; specific product characteristics) provided by the national brand name and label information as relevant and predictive of a higher beef quality. This finding is in line with the suggestion by Brunsø *et al.* (2005) that only when a brand translates intrinsic product characteristics, usually difficult to evaluate, to extrinsic ones, and thus makes them visible, will the brand actually signal the quality of the product.

On the other hand, the fact that both *National* and *Brazilian* beef were unknown store brands, might have led consumers to prefer national branded *Carnalentejana* beef. This is supported by the studies of Richardson, Dick and Jain (1994), Bellizzi *et al.* (1981), and Cunningham, Hardy and Imperia (1982). Moreover, *Carnalentejana* is a well known national brand name among Portuguese consumers (Banović *et al.*, 2008), might have override much of the label information, Chapter 7. In other words, once the consumer recognises the well-know national brand name, the details on its label become of minor importance. That is, consumers' prior experience and confidence in credibility of *Carnalentejana* brand might have influenced evaluations of both quality cues and quality aspects leading to increased expected quality of this beef. This is in accordance with previous research, on branded beef by Bredahl (2003), which has shown that prior experience with the particular brand might influence not only expected quality, but also future purchases. Moreover, it has also revealed that familiar brand might overrule the influence of other product information, such as intrinsic cues, promotional material, package and price, on expected beef quality.

Second, preference for *Carnalentejana* beef stays highly consistent even after *blind tasting*, where consumers differentiate this beef from the other two beef brands on all sensory dimensions: taste, tenderness, and juiciness, and choose it as the preferred one. Finding that *Carnalentejana* beef was perceived as better on all sensory aspects might suggest that *Carnalentejana*, being an autochthonous Portuguese breed, raised in a traditional way, where steers are kept on natural and/or improved pastures and supplemented with forages and/or concentrates during the periods of low availability of grass (Barreira *et al.*, 2009) can have distinctive features that lead

consumers, in a *blind taste*, to evaluate this beef as better when comparing it to others. This finding is in agreement with other studies, which have shown that the production system that includes breed, slaughter weight, and fattening of the animals affect their meat characteristics (Oliver *et al.*, 2006; Realini *et al.*, 2004).

Third, in the case of *Brazilian* beef, consumers use more intrinsic quality cues to form expectations about beef eating quality, while extrinsic cues are important in the case of *Carnalentejana* beef. This finding confirms conclusions mentioned above, that consumers' acquaintance with the national brand name *Carnalentejana* might have overruled other product information. Moreover, consumers regarded this well-known brand as much more relevant and trustworthy to make judgements of beef quality, than the unknown store brand associated with *Brazilian* beef. Furthermore, as majority of consumers were highly educated, it might be that they are more aware of the certain intrinsic *qualities* national beef *Carnalentejana* might possess when compared to *Brazilian* beef. Hence, as the store brand of *Brazilian* beef does not have an effective communication strategy, it cannot enjoy the same advantages relevant to familiar national brand. Hence, this again confirms that brand functions better if it has a strong consumers' recognition (Richardson, Dick & Jain, 1994), that is, if consumers have knowledge and ability to recall of this brand (Juhl *et al.*, 2006). Furthermore, *Brazilian* beef is a lower priced, poorly packed beef, with no label information on production method or objective product characteristics, which apparently leaves additional vague impression on the consumers. Consequently, this might led consumers not only to discount quality of *Brazilian* beef, but also to increase reliance on perceived intrinsic quality cues.

Fourth, consumers perceived price to be a quality indicator for *National* beef, where higher price was linked to higher beef quality, while for *Brazilian* beef consumers regarded price as an unimportant factor. The case of *National* beef may be explained by the fact that when the product does not carry a strong brand, price may be used to reduce the purchase risk and to re-identify the product (Monroe & Krishnan, 1985; Stokes, 1985). On the other hand, as *Brazilian* beef is lower priced beef than other two beef brands, consumers use more intrinsic quality cues and country of origin to summarise the available information (Johansson, 1989). For *Carnalentejana* beef, price was perceived as unimportant due to the presence of a strong brand name which set aside the effect of price. This is in accordance with research by Olson (1977), which showed that price becomes less important as a quality cue when other quality cues, such as brand are present. However, unimportance of price in the quality evaluation of *Carnalentejana* beef might also be owed to the fact that this group of consumers were highly educated individuals, with medium to high income, who probably care less about the price, than they do about quality.

Finally, results show that that the relationship between experienced eating quality and further purchase is very strong for all three types of beef, but is significantly different between *Brazilian* and *Carnalentejana* beef and likewise between *Brazilian* and *National* beef. This relationship was much stronger for *Brazilian* beef. These findings can be explained by the fact that in the *blind-tasting* phase, consumers did not have the information (e.g. brand, price) and the knowledge which beef they are experiencing, thus the larger variation in sensory quality with regard to *Carnalentejana* and *National* beef, and more constant quality of *Brazilian* beef, led consumers to be more sure of their future purchase in the case of *Brazilian* beef. Notice that *Brazilian* beef was less appreciated than *Carnalentejana* beef.

The aforementioned results have implications for the beef sector. Regarding in particular *Carnalentejana* beef, the results have demonstrated the impact this kind of national brand name can have on the perceived beef quality. That is, a brand backed by an effective communication strategy, related to specific product characteristics and production methods (relevant for the consumers), and considered as predictive of higher beef quality, can be very valuable in the marketplace. On the other hand, store brands not consistently positioned and lacking of relevant product-related information, might lead consumers to perceive them as ambiguous and of lower value, when compared to those products with a well-known national brand name. Here, making investments in strong brand image, besides improvements in the extrinsic cues associated with store brands, as package design and labelling may increase consumers' quality expectations of products carrying those brands. Alternately, the provision of products with more consistent quality may increase the perceived quality and influence future purchases of store brands. On the other hand, failing to provide consistent quality may result in disconfirmation and decrease of the perceived quality of national brands.

Another relevant implication for *Carnalentejana* beef and its producers is that consumers indeed differentiate this beef from others, not only at the purchase point, but also in the consumption phase and on all sensory dimensions. A traditional production system like in the case of Alentejana breed does add value to the product. Nevertheless, producers and marketers of *Carnalentejana* beef should be aware of their vulnerability to quality variation, as having a strong brand image without delivering a corresponding level of product quality may result in lower consumers' willingness to pay the premium for national brands.

The main objectives of this chapter are to understand how Portuguese consumers perceive beef quality in a real-life purchase environment, which intrinsic and extrinsic quality cues consumers use when evaluating and forming beef quality expectations, and how extrinsic quality cues influence the perception of intrinsic quality cues. Furthermore, this chapter attempts to investigate how quality expectations are related to quality experience and future purchase intention after blind-tasting of beef steaks. Results show that extrinsic quality cues influence perception of intrinsic quality cues. Brand was found to be the predominant extrinsic quality cue. Consumers used brand both for perception of intrinsic quality cues and for inference of quality expectations.

11

Beef quality perception at the point of purchase: A study from Portugal[1]

11.1 Introduction

The consumer research literature suggests that the quality perception process actually captures two phases: (i) based on perceived intrinsic and extrinsic quality cues quality expectations are formed at the purchase point, and (ii) after meal preparation and consumption of the product at home, quality experience is formed when quality expectations are actually confirmed or rejected (Acebrón & Dopico, 2000; Andersen, 1994; Grunert *et al.*, 1996; Steenkamp & van Trijp, 1996). This confirmation or rejection of the expectations further on determines final satisfaction with the product and repeat purchase (Oliver, 1980).

In the case of beef, studies that explore beef quality perception as a whole, both before and after beef consumption, are relatively rare. Moreover, in some studies no distinction has been made between expected and experienced beef quality. Most of the research is more exploratory (Becker, Benner & Glitsch, 2000; Becker, 2000; Glitsch, 2000), or addresses the influence of quality cues only on expected quality, not considering experienced quality (Grunert, 1997). Only a few integrated analyses of expected and experienced quality in order to get a complete picture of the full process of beef quality perception have been made, and only few studies have monitored the beef quality perception process as a whole (Acebrón & Dopico, 2000; Bredahl, 2003; Brunsø *et al.*, 2005). On the other hand, when both expected and experienced quality have been considered, collection of the data is often done in a controlled setting rather than in a real buying situation. To our knowledge, only two studies have been done in a real-life purchase situation (Acebrón & Dopico, 2000; Bredahl, 2003). Acebrón and Dopico (2000) investigated the influence of both intrinsic and extrinsic quality cues on perceived beef quality. However,

[1]This chapter has been published as: Banović, M., Grunert, K.G., Barreira, M.M. & Aguiar Fontes, M. (2009). Beef quality perception at the point of purchase: A study from Portugal. *Food Quality and Preference*, *20*, 335-342.

questionnaires were given to the consumers to fill in after buying beef, and actual utilisation and perception of intrinsic and extrinsic cues, as well as the formation of expected quality, were not solicited at the shop. Since actual inference making took place at the shop, consumers' answers were lacking a real-life element. Bredahl (2003) has investigated the impact of both intrinsic and extrinsic quality cues on perceived beef quality, where both expected and experienced quality were taken into account through real-life behaviour. However, beef steaks were from a special beef production and were placed in a separate cooling counter, limiting consumers comparison with other cuts from the same type of beef. Both studies accessed experienced beef quality at home, in a real consumption situation.

Another point that has been rarely explored in consumer studies about quality perception process is the interrelations between extrinsic and intrinsic quality cues, despite the fact that (Grunert, 1997), while exploring the influence of various intrinsic and extrinsic cues on perceived costs, colour, and fat of beef, has shown that fat and cut actually affect perceived costs, and that significant interrelations exist between colour and fat. These findings suggested that consumers do not perceive each quality cue in isolation, but rather that the perception of quality cues represents a cognitive web where cues interact.

Summing up, the possible influence of extrinsic quality cues on perception of intrinsic quality cues and further on perceived beef quality is almost unexplored. Likewise, beef quality perception both before and after consumption has not been given much attention, and the evaluation of beef quality in connection with a real purchase situation has rarely been studied.

Beef consumption in Portugal comes third after pork and poultry consumption. Recent figures on Portuguese beef consumption show an annual per capita consumption of approximately 18 kg, which is similar to the average in the European Union (EU). However, Portugal is not self-sufficient in beef production (self-sufficiency ratio of 62% in 2005), with the European Union (EU) being the major source of beef imports. Within the EU Spain, Netherlands, and France are the main suppliers, while Brazil is the main one outside the EU. In Portugal, beef production with quality labels has increased in the last decade and accounts for approximately 3% of the total beef production in terms of slaughters approved for consumption. Nevertheless, studies that explore Portuguese consumers' quality perception regarding beef, and branded beef in particular, are almost none.

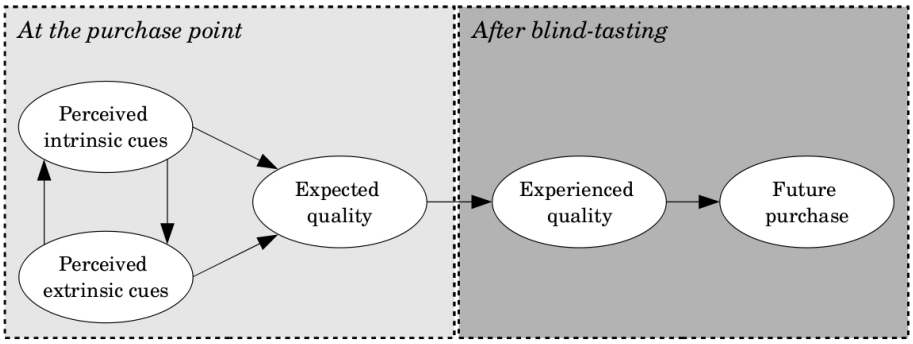
Therefore, using a real-life beef purchase situation, branded beef, and the Portuguese consumer as a case study, the objectives of this research were fivefold: (i) to analyse which intrinsic and extrinsic quality cues consumers use to form quality expectations when buying beef; (ii) to analyse the possible effect of extrinsic quality cues on intrinsic quality cues when buying beef; (iii) to measure consumers' experienced quality after beef *blind-tasting* at the buying location; (iv) to compare expected and experienced quality at the same spot; and (v) to analyse how the relation between expected and experienced quality determines future beef purchase intentions.

The model for the present research is based on the *total food quality model* (*TFQM*) by Grunert *et al.* (1996), Figure 2.11, since it has been already employed as a general framework in research on consumers' quality perception of meat (Bredahl, 2003; Bredahl, Grunert & Fertin, 1998; Brunsø *et al.*, 2005; Grunert, 1997). Moreover, it is thought to be useful in understanding consumer perception of beef quality as it is based on latent constructs[2] and can be simplified or

[2]The latent constructs, or factors, are complex theoretical forms that cannot be observed or measured directly. As such, the latent construct is linked to measurable variables, thereby making its measurement possible. These

changed in relation to the actual objective (Bech *et al.*, 2001). In the present study, *TFQM* has been adapted in several ways. The first adaptation of *TFQM* is that a distinction was made between at the point of purchase and after *blind-tasting* evaluations. This is done in order to reduce the time lag between the two evaluations. In the point of purchase phase, it is shown how intrinsic and extrinsic quality cues are perceived and how they further influence expected quality in a real-life purchase environment (supermarket), when consumers have already decided on the beef purchase. In the *blind-tasting* phase, we try to capture how quality experience and future purchase intention are formed at the same location. A graphical overview of the research is presented in Figure 11.1, using the *TFQM* terminology.

Figure 11.1: *Constructs and their interrelationship.*



11.2 Research design

The present research was conducted in a particular supermarket where beef consumers were interviewed and invited to participate in a beef *blind-tasting*, using two questionnaires. In the following, we will first describe the questionnaires. After that, the three types of beef steaks selected for the study will be discussed. Finally, we describe the data collection process.

This research draws on two previous studies for identifying relevant quality cues and quality aspects for the Portuguese beef consumer: (i) a focus group study and (ii) a quantitative consumer survey. The results from these studies (Project AGRO 422; Aguiar Fontes *et al.*, 2008) together with what was found in the existing literature on beef quality perception (Acebrón & Dopico, 2000; Becker, Benner & Glitsch, 2000; Bernués, Olaizola & Corcoran, 2003a,b; Bredahl, 2003; Brunsø *et al.*, 2005; Glitsch, 2000; Grunert, 1997; Steenkamp & van Trijp, 1996; Verbeke & Viaene, 1999b; Verbeke & Ward, 2006) were used as input to design the present research (see Subsection 2.4, Table 2.3, and Chapters 8 and 9).

11.2.1 Questionnaire and measures

The questionnaire had two parts: the first part contained questions on quality cues (both intrinsic and extrinsic), and expected beef quality. The second part covered questions on experienced

measured variables serve as indicators of the underlying construct that they are presumed to represent. Given the necessary bridging process between observed variables and unobserved latent construct, it is of the outmost importance that the choice of measured variables be sound and credible.

beef quality and future purchase intention and was administered after *blind-tasting* of beef steaks at the supermarket. Both quality cues and aspects of expected and experienced quality were drawn from the literature review and from our preliminary research. Perception of quality cues and quality aspects as well as future purchase intention were measured on seven-point intensity scales. The variables and their measures are listed in Table 11.1.

Table 11.1: *Selected variables and types of scale.*

Variable	***Scale endpoints***	
Perceived intrinsic quality cues[a]		
Colour	1 - Absolutely dislike	7 - Absolutely like
Fat	1 - Absolutely dislike	7 - Absolutely like
Cut	1 - Absolutely dislike	7 - Absolutely like
Perceived extrinsic quality cues[b]		
Brand	1 - Absolutely dislike	7 - Absolutely like
Origin	1 - Absolutely dislike	7 - Absolutely like
Price	1 - Not at all expensive	7 - Extremely expensive
Expected quality[c]		
Taste	1 - Not at all tasty	7 - Extremely tasty
Tenderness	1 - Not at all tender	7 - Extremely tender
Juiciness	1 - Not at all juicy	7 - Extremely juicy
Leanness	1 - Not at all lean	7 - Extremely lean
Freshness	1 - Not at all fresh	7 - Extremely fresh
Healthiness	1 - Not at all healthy	7 - Extremely healthy
Nutrition	1 - Not at all nutritious	7 - Extremely nutritious
Safety	1 - Not at all safe	7 - Extremely safe
Experienced quality[d]		
Taste	1 - Not at all tasty	7 - Extremely tasty
Tenderness	1 - Not at all tender	7 - Extremely tender
Juiciness	1 - Not at all juicy	7 - Extremely juicy
Leanness	1 - Not at all lean	7 - Extremely lean
Freshness	1 - Not at all fresh	7 - Extremely fresh
Healthiness	1 - Not at all healthy	7 - Extremely healthy
Nutrition	1 - Not at all nutritious	7 - Extremely nutritious
Safety	1 - Not at all safe	7 - Extremely safe
Future purchase intention[e]	1 - Definitely will not buy	7 - Definitely will buy

[a]Perceived intrinsic quality cues when choosing beef.

[b]Perceived extrinsic quality cues when choosing beef.

[c]Expected quality when choosing beef.

[d]Experienced quality after *blind-tasting*.

[e]Future purchase intention after *blind-tasting*.

11.2.2 Beef

Beef steaks from three different breeds, and production methods were selected; each provided by different suppliers available on the market. All beef steaks were taken from the same type and of the same part of the animal (*strip loin* muscle), and cut in the same way. This procedure was carried out by the supermarket's meat department. All beef steaks were further on packed in conventional plastic trays (weight $\cong$ 500g), meeting legal requirements, i.e. type of product, number or reference code (code to relate meat and the animal), date of slaughter, permit number of the slaughterhouse (place where the animal was slaughtered), permit number of the establishment where the animal was broken down, expiry date, weight, origin, price (per kilogram of meat and per package) and an additional marketing element - brand. All beef steaks used in the study were placed in their habitual cooling counter, where the consumers expect to find them.

Beef steaks used for tasting were from the same type as the beef steaks picked by the consumer at the cooling counter. This was considered crucial for later comparison between visual inspection in the pre-purchase phase and experience in the later consumption phase. The supermarket's meat department was in charge of preparing and cutting beef steaks for tasting to ensure that beef steaks were all cut in the same way. Beef steaks for tasting were stored in safe cooling conditions until grilling. The grilling took place at the supermarket with the appropriate equipment and by a professional cook. All beef steaks were grilled at the same temperature and in the same way, without any salt or spices.

11.2.3 Respondents and data collection

The data collection was carried out in May and June 2007. To ensure a sufficient amount of potential respondents the trial was held in a large supermarket in the Lisbon area. The supermarket was selected because consumers from various districts and various socio-economic categories do their shopping there, but also because branded beef is mainly sold through this type of outlet.

Questionnaires were administered to consumers once they had picked a particular beef package and put it in their shopping trolley. Only consumers who were willing to participate in the whole trial were interviewed. First, consumers were asked about perceived quality cues, expected quality, and previous experience as regards the particular type of beef purchased, as well as two other beef products available in the cooling counter. After answering this first part of the questionnaire, they were asked to approach the grilling table in order to participate in a *blind-tasting test*, comparing beef steaks from these three types. Beef steaks were grilled by a professional cook in front of the respondent. After *blind-tasting* each beef steak, respondents went through the second part of the questionnaire covering experienced quality and future purchase intention of each type of beef. Only full questionnaires with valid answers were kept. Questionnaires from consumers who gave up in the middle of the trial before tasting the beef steaks were discarded. Finally, 300 valid observations (100 per each type of beef) were obtained.

11.3 Data analysis

The main objective was to quantify the relationships between perceived intrinsic quality cues, perceived extrinsic quality cues, expected quality, experienced quality, and finally future purchase intention, using as the starting point the model presented in Figure 11.1. Three models were estimated: *Model A*, *Model B*, and *Model C*. *Model A* is based on the generic links presented in Figure 11.1, where it is assumed that intrinsic and extrinsic quality cues freely correlate and directly affect expected quality, which is related to experienced quality and, finally, future purchase intention. In *Model B* it is assumed that consumers form an overall evaluation based on the physical appearance (i.e. intrinsic construct); this impacts on quality expectations rather than individual cues, and similarly that consumers form an impression of overall attractiveness based on the available information (i.e. extrinsic construct). Thus, it is investigated how quality cues mediated by its constructs, i.e. intrinsic and extrinsic, influence expected quality, as well as how perceived extrinsic cues influence perception of intrinsic cues. The other relationships are the same as in Model A. *Model C* represents a hybrid of *Model A* and *Model B*. Thus, in *Model C* the latent construct of extrinsic cues is omitted and it is investigated how different

extrinsic cues influence overall evaluation of intrinsic cues.

Model A differs from Models B and C such that we can observe the direct influence of each perceived cue on expected quality and, consequently, how these relationships influence the quality perception process. By comparing these three models, we can see how the inclusion of latent constructs for extrinsic and intrinsic cues influences the final model fit; furthermore, these models supply us with different types of information. In *Model A*, it can be seen how various quality cues directly influence expected quality, though it is not obvious how consumers form evaluations of perceived intrinsic and extrinsic quality cues. In *Model B*, one can see how consumers perceive intrinsic and extrinsic quality cues, as well as how perceived extrinsic quality cues influence perception of intrinsic quality cues. However, it is not clear which extrinsic cues have a higher weight in their influence on the perception of intrinsic quality cues, as extrinsic cues are related to its latent construct. In *Model C*, it can be seen how various extrinsic quality cues directly influence perception of intrinsic cues, though one cannot tell how consumers form evaluations of perceived extrinsic quality cues. Therefore, these models complement each other.

In order to estimate these models, four steps are required:

(i) the investigation of the strength of relationships among quality cues, expected and experienced quality and future purchase intention;

(ii) the exploration of dimensionality of perceived quality cues, expected and experienced quality;

(iii) the confirmation and validation of detected dimensionality and, finally,

(iv) the testing of the assumed relationships.

First, the strength of the relationships among quality cues and quality aspects, as well as between expected and experienced quality, and experienced quality and future purchase intention were investigated by means of inter-item correlations. Secondly, the dimensionality of each latent construct, presented in Figure 11.1, was explored with factor analysis (using *SPSS 15.0*, *principal component analysis* (*PCA*), *Varimax* rotation with *Kaiser* normalisation). Thirdly, based on the exploratory factor analysis, a *confirmatory factor analysis* (*CFA*) was conducted and a measurement model was established (using *LISREL 8.8*), with the measured variables as indicators of latent constructs. This measurement model was established in order to confirm and validate a set of latent constructs (factors) obtained in the exploratory factor analysis and to enable further study on the relationship among the latent constructs. With the latent constructs defined, structural relationships among the constructs were established and translated into a suitable structural model (using *LISREL 8.8*).

The two goodness-of-fit statistics normally used for the measurement and structural models are reported here. The first one to be reported is the *root mean square error of approximation* (*RMSEA*) (Steiger & Lind, 1980), since it was recognised as the most informative criterion in covariance structure modelling (Byrne, 1998). *RMSEA* is a measure of discrepancy between the observed and estimated covariance matrix per degree of freedom. *RMSEA* values of less than 0.05 indicate a good fit and values as high as 0.08 are also acceptable (Byrne, 1998). *goodness-of-fit index* (*GFI*) is the second measure to be reported. The *GFI* represents overall degree of model fit and is a measure of relative amount of observed covariances explained by the estimated covariances. This index range from zero to one, with values close to one being indicative of a model's good fit (Jöreskog & Sörbom, 1993).

11.4 Results

11.4.1 The strength of the relationships

The *PCA* analysis takes into account inter-item correlations when estimating the weights of the individual items in determining the underlying latent constructs. Also, structural equation modelling examines simultaneously a series of interrelated dependence relationships among the measured items and latent constructs as well as between several latent constructs. Nevertheless, inter-correlations between quality cues, expected and experienced quality aspects were examined and are presented in the following.

An analysis of inter-correlations of the six quality cues revealed most of the correlations above 0.3, and significant at $p<0.01$, Table 11.2, which was considered appropriate for further analysis. Interestingly, the quality cue brand is significantly correlated with a number of quality cues, and especially with origin and colour.

Table 11.2: *Correlation of quality cues.*

	Colour	***Cut***	***Fat***	***Origin***	***Brand***	***Price***
Colour	1.00					
Cut	0.50	1.00				
Fat	0.45	0.36	1.00			
Origin	0.38	0.30	0.30	1.00		
Brand	0.44	0.31	0.32	0.64	1.00	
Price	0.14	0.27	0.07	0.25	0.35	1.00

All correlations significant at $p<0.05$, except for price and fat.

As seen from Tables 11.3 and 11.4, a number of quality aspects are highly correlated, in particular for expected and experienced taste and tenderness, for expected and experienced taste and juiciness, for expected and experienced tenderness and juiciness, and for expected and experienced nutrition and healthiness.

Table 11.3: *Correlation of expected quality aspects.*

	Taste	***Tenderness***	***Juiciness***	***Leanness***	***Freshness***	***Nutrition***	***Healthiness***	***Safety***
Taste	1.00							
Tenderness	0.75	1.00						
Juiciness	0.73	0.73	1.00					
Leanness	0.13	0.22	0.18	1.00				
Freshness	0.49	0.51	0.55	0.18	1.00			
Nutrition	0.40	0.39	0.35	0.32	0.43	1.00		
Healthiness	0.41	0.43	0.36	0.37	0.39	0.66	1.00	
Safety	0.56	0.54	0.54	0.20	0.54	0.53	0.61	1.00

All correlations significant at $p<0.01$.

Table 11.4: *Correlation of experienced quality aspects.*

	Taste	***Tenderness***	***Juiciness***	***Leanness***	***Freshness***	***Nutrition***	***Healthiness***	***Safety***
Taste	1.00							
Tenderness	0.61	1.00						
Juiciness	0.62	0.69	1.00					
Leanness	0.21	0.15	0.20	1.00				
Freshness	0.35	0.42	0.47	0.27	1.00			
Nutrition	0.16	0.22	0.33	0.18	0.36	1.00		
Healthiness	0.27	0.21	0.32	0.14	0.31	0.64	1.00	
Safety	0.36	0.29	0.31	0.12	0.51	0.47	0.58	1.00

All correlations significant at $p<0.01$.

Table 11.5: *Correlation between expected and experienced quality aspects.*

Quality aspects	*Correlation*
Healthiness	0.39
Safety	0.39
Nutrition	0.33
Taste	0.29
Freshness	0.28
Juiciness	0.24
Tenderness	0.23
Leanness	0.18

All significant at p<0.01.

Table 11.6: *Correlation between experienced quality and future intention to buy beef.*

Quality aspects	*Correlation*
Taste	0.62
Tenderness	0.61
Juiciness	0.57
Leanness	0.36
Freshness	0.21
Nutrition	0.18
Healthiness	0.16
Safety	0.12

All significant at p<0.01.

In order to investigate how consumers were able to predict the quality of beef after the *blind test*, and what quality aspects had the most influence on the intention to buy beef, further correlation analyses were carried out, Tables 11.5 and 11.6. Based on the measurements of expected and experienced beef quality on the eight criteria, correlation analysis showed low correspondence between expected and experienced quality aspects. Low correspondence is found more for experience characteristics (i.e. leanness, tenderness, juiciness, freshness, and taste) than for credence ones (i.e. healthiness, safety, and nutrition). This can be seen in the light of the fact that experience characteristics are more likely to be disconfirmed than credence characteristics, which usually does not disconfirm expectations. However, in our case, correlation between credence characteristics is not extremely high.

Table 11.6 shows that the intention to buy beef is highly correlated with experience characteristics (i.e. taste, tenderness, and juiciness). This can be explained from the viewpoint that the weights of the quality aspect might change along the quality perception process, and quality aspects more accessible to the senses (like taste, tenderness and juiciness) may have more weight in the quality experience phase than those which are not (like healthiness and nutrition). In that manner, experience characteristics might have more influence on re-purchase of the beef than credence ones.

11.4.2 Dimensionality of quality cues, expected and experienced quality

In order to investigate the dimensionality of perceived quality cues, expected and experienced quality, *PCA* analyses were performed. The factor structure obtained is shown in Table 11.7.

The *PCA* analysis on quality cues revealed a two-dimensional factor solution where both factors had *eigenvalues* over 1, with 63% of total variance explained. The first factor, intrinsic, covered three items: cut, colour, and fat, and the second factor, extrinsic, covered three items: price, brand, and origin.

The *PCA*[3] analysis of the items measuring expected quality, also resulted in a two-dimensional factor solution, where both factors had *eigenvalues* over 1, with 83% of total variance explained (*Bartlett's test for sphericity*: $\chi^2(28)=768.13$ (<0.001); *Kaiser-Meyer-Olkin measure of sampling adequacy*: $KMO=0.78$). The first factor, expected *eating* quality, covered three items: juiciness, tenderness, and taste. The second factor, expected *health* quality, covered two items:

[3]Items leanness, freshness and safety were not included in these *PCA* analyses because their loadings were below the commonly used threshold value for acceptable reliability (Hair *et al.*, 2006).

nutrition and healthiness.

Results from the *PCA*[3] analysis on items from the evaluation of experienced quality also showed a two-factor solution with *eigenvalues* over 1, and 79% of total variance explained (*Bartlett's test for sphericity*: $\chi^2(28)$=578.41 (<0.001); *Kaiser-Meyer-Olkin measure of sampling adequacy*: *KMO*= 0.69). Again tenderness, juiciness, and taste comprised factor experienced *eating* quality, while nutrition and healthiness comprised factor experienced *health* quality.

Table 11.7: *Results of PCA analysis of quality cues, expected and experienced quality.*

Constructs	***Indicators***	***Factor 1***	***Factor 2***
Quality cues[a]			
Intrinsic quality cues			
	Cut	0.83	
	Colour	0.81	
	Fat	0.61	
Extrinsic quality cues			
	Price		0.81
	Brand		0.73
	Origin		0.66
Eigenvalue		2.06	1.74
Variance explained (%)		34.26	29.14
Cumulative variance (%)		34.26	63.33
Expected quality[b]			
Expected eating quality			
	Juiciness	0.89	
	Tenderness	0.88	
	Taste	0.87	
Expected health quality			
	Nutrition		0.89
	Healthiness		0.88
Eigenvalue		2.42	1.71
Variance explained (%)		48.40	34.24
Cumulative variance (%)		48.40	82.64
Experienced quality[c]			
Experienced eating quality			
	Tenderness	0.88	
	Juiciness	0.85	
	Taste	0.85	
Experienced health quality			
	Nutrition		0.90
	Healthiness		0.88
Eigenvalue		2.26	1.68
Variance explained (%)		45.16	33.57
Cumulative variance (%)		45.16	78.73

Varimax rotated solutions. Loadings <0.5 excluded.

[a] *Bartlett's test for sphericity*: $\chi^2(15)$=454.13 (<0.001)
Kaiser-Meyer-Olkin measure of sampling adequacy: *KMO*=0.75.

[b] *Bartlett's test for sphericity*: $\chi^2(10)$=768.13 (<0.001);
Kaiser-Meyer-Olkin measure of sampling adequacy: *KMO*=0.78.

[c] *Bartlett's test for sphericity*: $\chi^2(10)$=578.41 (<0.001);
Kaiser-Meyer-Olkin measure of sampling adequacy: *KMO*=0.69.

11.4.3 Estimation of the measurement model

The measurement model was estimated with the items used as indicators of the latent constructs corresponding to the pattern detected in the *PCA* analysis, Table 11.7. In that way, intrinsic quality cues were indicated by three items, extrinsic quality cues by three items, expected and experienced *eating* quality by three items, and expected and experienced *health* quality by two items. In the model, future purchase intention was established as a single-indicator latent construct. The item reliability of the single-indicator latent construct was set at 0.85 as recommended by Jöreskog and Sörbom (1993).

The resulting measurement model had satisfactory fit measures (*RMSEA*=0.046; *GFI*=0.94) and the analysis supported the earlier elicited structure. However, a review of the *modification indices* (*MI*) revealed possibilities for improving the model by freely estimating error covariance between items fat and price, and fat and health. Unquestionably, allowing correlated errors to achieve a better fitting model is not acceptable in practice and such a manoeuvre must be supported by a substantive rationale, an empirical rationale, or both (Jöreskog, 1993). We believe that we have such a case here and that it is perfectly reasonable with respect to beef. Specifically, correlated errors in the present

context replicate findings from other studies. For example, Grunert (1997) found a relationship between perceived fat and the perceived cost of beef. Other studies have shown that consumers usually selected lean meat since it is perceived to be healthier, and thus perceived higher content is negatively related to perceived health (Bredahl, Grunert & Fertin, 1998; Savell *et al.*, 1989). It is important to note that the process of specification of correlated errors involved two separate model specifications and estimations, yielding correlated errors between fat and price, and fat and health, 0.38 and -0.30 (both significant at $p<0.05$), respectively.

As a result, the measurement model was re-estimated. Turning first to the goodness of fit results for the re-estimated model, we can see a fairly good improvement in the overall fit in comparison with the previous model in which no error covariances were specified. More specifically, *RMSEA* has dropped to 0.036 (from 0.046) and *GFI* has increased to 0.95 (from 0.94).

Table 11.8: *Final measurement model.*

Latent constructs	***Indicators***	***Completely standardised loadings***	***Item reliabilities***
Intrinsic quality cues			
	Colour	0.81	0.65
	Cut	0.61	0.38
	Fat	0.59	0.35
Extrinsic quality cues			
	Brand	0.86	0.75
	Origin	0.74	0.55
	Price	0.38	0.14
Expected eating quality			
	Taste	0.88	0.78
	Tenderness	0.85	0.72
	Juiciness	0.84	0.70
Expected health quality			
	Health	0.80	0.65
	Nutrition	0.83	0.69
Experienced eating quality			
	Taste	0.74	0.54
	Tenderness	0.83	0.68
	Juiciness	0.84	0.70
Experienced health quality			
	Health	0.89	0.79
	Nutrition	0.72	0.51
Future purchase intention			
	Intention to buy	0.86	0.85

The revised measurement model along with estimated item reliabilities are shown in Table 11.8. The presented measurement model can be used to access the relative importance of various items in determining the constructs. The estimated item reliabilities display the extent to which each item adequately measures its respective underlying construct (Byrne, 1998). As can be seen from Table 11.8, brand and origin reflect the extrinsic construct best, while price seems to be a less good indication of this construct. The intrinsic construct seems to be reflected better by colour of the meat, and less well by cut and fat. Other constructs in the measurement model, i.e. expected and experienced *eating* and *health* quality and future purchase intention seem to be well explained by the respective indicators.

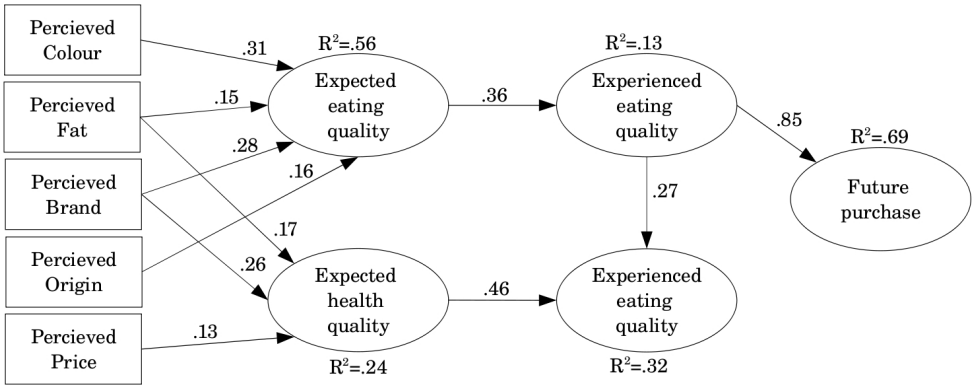
11.4.4 Estimation of structural models

We now move forward to estimate how perceived quality cues, expected, and experienced quality, and finally future purchase intention relate to each other. As mentioned previously, *Models A*, *B* and *C* investigate relationships between perceived quality cues, expected (i.e. expected *eating* and *health* quality) and experienced quality (i.e. experienced *eating* and *health* quality) and future purchase intention. The actual difference between these models is that in *Model A* direct influence of each quality cue on expected *eating* and *health* quality is apprehended, by omitting

perceived constructs. *Model B* deals with indirect influence (through extrinsic construct) of perceived extrinsic cues on perceived intrinsic cues and on expected *eating* and *health* quality, while *Model C* deals with direct influence of perceived extrinsic cues on intrinsic quality cues and on expected *eating* and *health* quality. Estimates for the three models are given in Figures 11.2, 11.3, and 11.4

The structural *Model A* was estimated on the basis of the latent constructs identified in the measurement model, Table 11.8, and on the hypothesised relationship in Figure 11.1, however omitting the perceived latent constructs of intrinsic and extrinsic quality cues. The results showed an adequate model fit, but modification indices strongly suggested a causal link from experienced *eating* quality to experienced *health* quality. This link was allowed since it seems reasonable to assume that the credence characteristics are inferred from experience characteristics, and seeing that experienced characteristics can have a higher weight in the experience phase. The added link improved the overall model fit, more specifically, *RMSEA* dropped to 0.053 (from 0.058), and the *GFI* increased to 0.94 (from 0.93). The final structural *Model A* and the results are shown in Figure 11.2.

Figure 11.2: *Constructs and their interrelationship.*

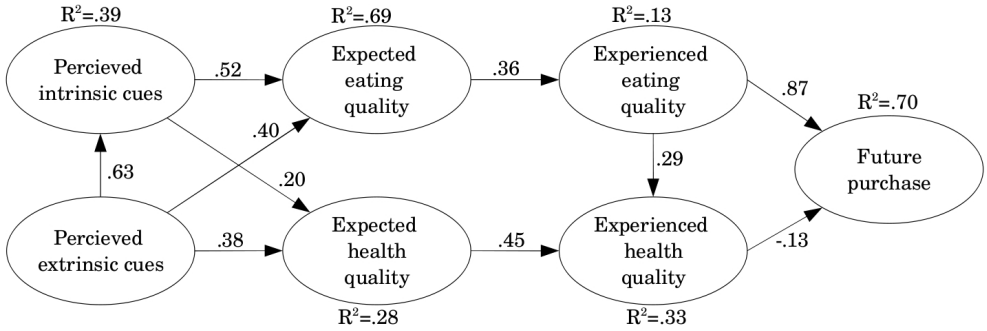


Only significant relationship shown. All significant at $p<0.05$.

As can be seen from Figure 11.2, and as previously mentioned in *Model A*, structural relations were investigated by omitting the latent constructs: perceived intrinsic and extrinsic quality cues, and by letting quality cues interrelate freely and directly influence expected *eating* and *health* quality. The inter-correlations between quality cues are not presented in Figure 11.2, since they have been already presented in Table 11.2 and discussed earlier. Results show that expected *eating* quality is directly affected by several quality cues, namely by colour, brand, origin and fat. These quality cues affect expected *eating* quality in such a way that the more ideally they are perceived, the higher the *eating* quality expected. For example, a more ideally perceived colour leads to higher *eating* quality expectations. On the other hand, expected *health* quality is affected by brand, fat, and price. Price is used as an indicator of quality, where higher price leads to an expectation of higher *health* quality. Interestingly, brand and fat were found to be the only cues influencing both *eating* and *health* expected quality. Cut was found to be an insignificant quality cue for both expected *eating* and *health* quality. The model also shows a significant relationship between expected and experienced quality, and more so for *health* quality than for *eating* quality. As a result, the overall explanation of experienced *health*

quality is higher because it is drawn from both expected *health* quality and experienced *eating* quality. Finally, future purchase intention for beef is highly explained by experienced *eating* quality.

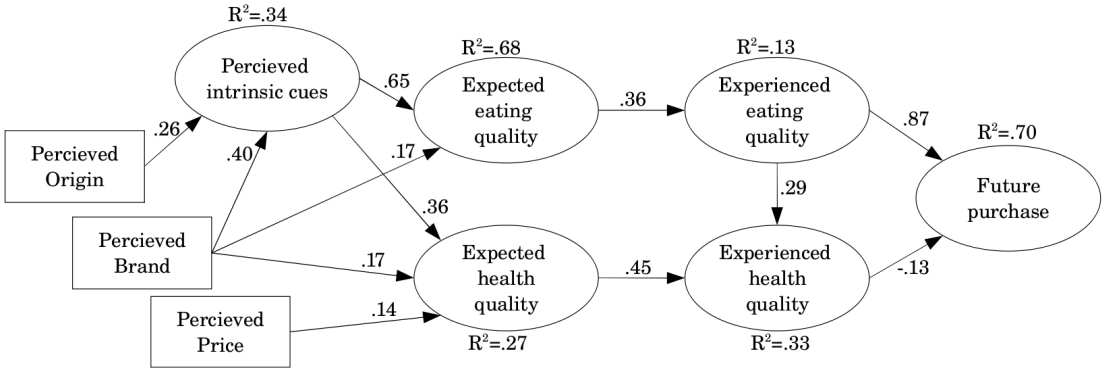
Figure 11.3: *Constructs and their interrelationship.*



All significant at p<0.05.

The estimated *Model B* also shows good fit of the data (*RMSEA*=0.048; *GFI*=0.93). The final structural model and results are presented in Figure 11.3. Results show that both perceived intrinsic and extrinsic quality cues are joint determinants of expected *eating* and *health* quality. This relationship is stronger for expected *eating* quality than for expected *health* quality. Moreover, expected *eating* quality is explained more by perceived intrinsic cues, while expected *health* quality is explained by perceived extrinsic cues. Nevertheless, the strongest influence in the model is definitely the influence of perceived extrinsic cues on perceived intrinsic cues. Perceived intrinsic cues are highly affected by perceived extrinsic cues and consequently the overall explanation of perceived intrinsic cues is impressively high. Further, considering the relationship between *eating* and *health* expected and experienced quality, the results are quite similar to those in *Model A*. Future purchase intention is likewise highly influenced by experienced *eating* quality, while influence of experienced *health* quality is weak and negative.

Figure 11.4: *Constructs and their interrelationship.*



Only significant relationship shown. All significant at p<0.05.

Now, we proceed with the estimation of *Model C*, omitting the latent construct - perceived extrinsic quality cues, while the other relationships in the model are maintained like in the

final *Model B*. Thus, in *Model C*, influence of each extrinsic quality cue on perceived intrinsic quality cues and expected *eating* and *health* quality can be viewed. The estimated *Model C* showed quite satisfactory fit ($RMSEA$=0.049; GFI=0.94). As seen from Figure 11.4, results show that brand and origin affect the perception of intrinsic cues, with brand as the dominant cue. Brand also affects *eating* and *health* quality expectations, while price influences only *health* quality expectations. Perceived intrinsic cues influence both expected *eating* and *health* quality, although more so for *eating* than *health* quality. The higher influence of perceived intrinsic cues on expected *eating* and *health* quality is observed in this model compared to *Model B* due to the fact that the perceived extrinsic construct is omitted and extrinsic quality cues are regarded separately. Considering the relationship between *eating* and *health* expected and experienced quality and future purchase intention, the results are quite similar to those in *Model B*, and will not be repeated.

11.5 Discussion and conclusion

There are several implications of the present study. First, the use of a real-life shopping situation sheds more realistic light on how consumers employ intrinsic and extrinsic quality cues to form beef quality expectations as consumers are approached when actually buying beef. Second, examining experienced quality right after the *blind-tasting*, which was done on the same spot as the notion of expected quality was formed, diminished the time lag between the quality evaluations. Third, and subsequently, observing the quality perception process, both before and after beef consumption (i.e. expected quality and experienced quality), allowed for a more exhaustive and complete picture of the beef quality evaluation process. Moreover, the evaluation of the beef quality perception process through structural equation modelling allowed for a simultaneous investigation of composites of and relationships between perceived intrinsic quality cues, perceived extrinsic quality cues, expected quality, experienced quality and, finally, future purchase intention. This type of approach to analysing the quality perception process in the case of beef is rarely employed, even though it is a suitable technique for a one-stop testing the entire theory. All the other multivariate techniques (e.g. multiple regression, canonical analysis, etc.) - although they provide the researcher with powerful tools - share a common limitation: they address a single relationship at a time. Yet, even when they allow multiple dependent variables, it still represents only single relationships between dependent and independent variables (Hair *et al.*, 2006). Fourth, and in terms of theoretical implications, the investigation of both direct and indirect influences of perceived extrinsic quality cues on the perception of intrinsic quality cues as well as on expected beef quality allowed for better understanding of extrinsic quality cues utilisation and their influence in inference making. Fifth, observing separate influence of each perceived quality cue on expected *eating* and *health* quality also adds to an understanding of cue usage and inference making, which is again of crucial importance for differentiated products. Similar research, though done for undifferentiated beef, was done by Grunert (1997) who showed interrelations between perceived cost and different levels of fat and influence of separate quality cues on expected quality both directly and through perceived constructs (i.e. fat, colour and price). Finally, the present research was based on a particular differentiated beef product: beef steaks from the *strip loin* muscle, which further on secures and validates the results obtained (e.g. exclude variability between samples).

The present research showed that extrinsic quality cues do indeed influence perception of intrinsic quality cues, with brand as the predominant quality cue. This finding is of great importance since the role of the brand in the perception of intrinsic quality cues in the case of beef has not been shown before. The fact that consumers use brand to perceive intrinsic quality cues, like colour and fat, indicates that they rely on the brand as a major quality cue helping them to reduce uncertainty of purchase due to the generally large biological variation in objective beef quality. Moreover, it also indicates that to consumers brand represents a superior quality indicator, which not only that provides consumers with additional information but also symbolises certain beef quality positioning. The brand name has previously been shown to be an important cue in consumers' inference making as well as to affect the perceived quality when there are actual differences in objective product quality among the brands offered (Dawar & Parker, 1994; Dodds, Monroe & Grewal, 1991). Henson and Northern (2000) also revealed that product branding can be crucial to perceived ability to judge beef safety at the point of purchase. In addition, our research demonstrated that when observing the direct influence of various quality cues on expected *eating* and *health* quality, brand appears to dominate the formation of expected quality, which is in accordance with previous research. The generally significant influence of brand on perceived quality, in the present research, may also be partially explained by the fact that the majority of consumers had prior knowledge of the brand. Research evidence supports a positive relationship between brand and expected beef quality where brand was generally found to be a determinant of both expected *eating* and *health* quality among low and high familiarity consumers (e.g. Bredahl, 2003).

The influence of perceived origin on perceived intrinsic quality cues and expected *eating* quality is also worth mentioning. It shows that Portuguese consumers of quality labelled beef perceive the region of production as a signal of enhanced quality, leading to better intrinsic attributes such as colour and fat, and consequently to higher expected beef *eating* quality. As Loureiro and Umberger (2000) have pointed out, indication of origin may become a signal of superior quality only if the consumers associate this origin with higher quality and safety. Although a direct influence was not detected between perceived origin and expected *health* quality, an indirect relationship actually exists, as perceived origin influences perceived intrinsic cues, which in turn influence expected *health* quality (*Model C*).

This study also showed that consumers perceive beef quality as a two-dimensional construct, comprised of *eating* and *health* dimensions, in both the expectation and experience phase, as shown in other studies (Bredahl, 2003; Brunsø *et al.*, 2005). Generally, experienced *health* quality was explained better than experienced *eating* quality. Of course, quality perception of credence *qualities* is always a matter of inferences, whereas quality perception of experience *qualities* is a question of inferences that can be confirmed or rejected. Moreover, experienced *eating* quality dominates consumers' future beef purchase intention. The strong influence of this sensory aspect of experienced quality on future purchase intention may be explained by the fact that those quality aspects more accessible to the senses have more weight in the experience phase than those that are not, i.e. credence (e.g. health and nutrition). Subsequently, that is why consumers related *eating* quality to *health* quality in the experience phase. Moreover, since this credence aspect cannot be ascertained before or after beef consumption, consumers needed something more down to earth to employ as a basis for their judgements of future purchase intention.

In conclusion, the question of cue utilisation and quality inference making is quite important in the functioning of markets dealing with undifferentiated products like beef (as well as meat in general). The understanding of these issues allows marketers to differentiate their products and communicate these differentiated *qualities* to consumers. Undoubtedly, to be able to do so, cattle producers and the slaughter industry must work together in a coordinated way, since it is known that, in the case of beef, the intrinsic quality and beef quality attributes, like fat content, flavour, juiciness, and tenderness, might be influenced by the breed type and production system (Chambaz *et al.*, 2003; Melton, 1990; Oliver *et al.*, 2006; Realini *et al.*, 2004). Consumers must be able to make inferences that will be predictive of later quality experience, leading to future re-purchase. If not, consumers will limit themselves only to the trial purchase. The present research clearly showed that branding could play an important role in marketing of differentiated meat products, and that consumers in general use this cue not only in the formation of quality expectations but also to perceive intrinsic quality cues.

This article examines the use of intrinsic and extrinsic cues in product quality judgements at the point of purchase and during product usage by consumers with different product-related experience. The use of intrinsic and extrinsic cues and product quality judgements may depend on previous product-related experience, a proposition that this study examines using multiple-group structural equation modelling. The analysis shows that expert and novice consumers display different cue usage strategies in their product quality assessments. Expert consumers use more intrinsic cues to assess product quality, based on their past experience regarding the relationship between intrinsic cues and product quality. Novice consumers, due to their inability to discern relevant information, instead tend to believe that the brand is the most valid cue for assessing product quality.

12

Impact of product-related experience on cue usage in product quality judgements[1]

12.1 Introduction

Consumer behavior literature makes it increasingly clear that product-related experience or familiarity affects information processing. Several empirical studies note the effects of product-related experience (or familiarity with the product) on information search (Savell *et al.*, 1989), use (Park & Lessig, 1981), and recall (Johnson & Russo, 1984) in product choice and product quality judgements. Product-related experience thus appears to influence the extent to which consumers search for, use, and recall information in their product choices and their product quality judgements (Rao & Monroe, 1988).

However, most research regarding the effects of product-related experience focuses on information processing while neglecting product quality evaluations (Bettman & Park, 1980; Olson, 1978). Studies analyse the influence of product-related experience on cue usage without considering the inferences that consumers make to evaluate product quality or the predictive capacity of these inferences for subsequent quality experiences (Masson & Bequette, 1998; Raju, Lonial & Magold, 1995). Research devoted to the effect of product-related experience on cue usage and overall product quality judgements seems potentially valuable; we report on our empirical investigation of this impact, at both the point of purchase and during product usage.

[1]This chapter has been submitted for publication as: Banović, M., Aguiar Fontes, M., Barreira, M.M. & Grunert, K.G. (2009). Impact of product-related experience on cue usage in product quality judgements.

12.2 Background

12.2.1 Product-related experience

Product-related experience and familiarity appear interchangeable in consumer behavior literature, in reference to consumers' prior product search, purchase, usage, and ownership (Alba & Hutchinson, 1987; Johnson & Russo, 1981; Park & Lessig, 1981). Regardless of the term used, researchers argue that multiple product-related experiences lead to better developed cognitive structures or knowledge *schema*s about the product (Hayes-Roth, 1977; Marks & Olson, 1981).

Schema theory also asserts, according to Olson and Dover (1978), that the goal of cognitive processing is the formation of a meaningful interpretation of the world. Thus, product information available to a consumer gets encoded and organized relative to the comprehensive framework of prior acquired knowledge that a consumer develops by accumulating product-related experiences.

This framework contains links among coded representations of general product class information, product attributes, product usage situations, and product-related experiences, as well as evaluations and choice rules (Olson, 1978; Peracchio & Tybout, 1996). Moreover, with frequent activation or as more product-related experiences occur, knowledge structures become stronger in memory (Hayes-Roth, 1977).

Subsequently, any relevant stimulus can activate the appropriate *schema*, which allows for the interpretation of the stimulus in light of that *schema*. In turn, the *schema* provide a structure of basic knowledge about a product, within which (and from which) the initial interpretation of the available information relevant to that product takes place (Olson & Dover, 1978).

The effective development of a product *schema* varies with the level of product-related experience. Expert and novice consumers thus should differ in their information processing because they possess varied *schematic* knowledge about the product (Alba & Hutchinson, 1987; Marks & Olson, 1981; Raju, Lonial & Magold, 1995). Expert consumers, with their multiple past experiences, are better equipped to understand the meaning of product information, so they seek particular product attributes, of which they are aware (Brucks, 1985). They also can focus on information that they know is more relevant and diagnostic for their product evaluations (Dick, Chakravarti & Biehal, 1990; Peracchio & Tybout, 1996). In contrast, novices, even if they base their judgements on the same set of product attributes as experts do, likely weight those attributes differently, because are less capable of understanding the relevance and implications of these attributes (Alba & Hutchinson, 1987).

12.2.2 Impact of product-related experience on cue usage in product quality judgements

Several researchers investigate the relationship between product experience and product-related information processing. Park and Lessig (1981) and Raju, Lonial and Magold (1995) both propose that product usage experience affects the use and relative importance of extrinsic and intrinsic cues in product evaluations. That is, people with less experience tend to base their product quality judgements on extrinsic cues, whereas with more usage experience, the importance of intrinsic cues grows.

Similarly, Bredahl (2003), in an investigation of the impact of product familiarity on the use of extrinsic and intrinsic cues, as well as expected and experienced product quality, confirms that product familiarity influences cue usage. Low familiarity consumers use extrinsic cues, with brand as the most important cue, because they lack sufficient knowledge to evaluate intrinsic cues. High familiarity consumers rely on both extrinsic and intrinsic cues.

These studies imply that novice consumers are more likely to use extrinsic cues in product quality judgements, because this information is easier to access, and they have relatively little knowledge about intrinsic product information stored in their memory. With increasing product-related experience, consumers accumulate such knowledge in their memory and increase their ability to judge product quality.

Therefore, experts have a better ability to assess the quality connotations of intrinsic cues. Consumers with more product experience can not only process available information but also acquire information that is more relevant for their product quality evaluations (Raju & Reilly, 1980; Savell *et al.*, 1989). Novices, who rely on less elaborated knowledge, are less able to distinguish between relevant and irrelevant information for their product evaluations (Marks & Olson, 1981; Meyers-Levy & Tybout, 1989).

Finally, Peracchio and Tybout (1996) argue that product evaluations by consumers with more elaborate product knowledge reflect the influence of appropriate *schema* and thereby offer more predictive product inferences than do those undertaken by consumers with less elaborate knowledge. Similarly, Dick, Chakravarti and Biehal (1990) suggest expert consumers develop stronger perceived correlations between known cues and product attributes (*qualities*) that they must infer. Conversely, novices base inferences on information that is available externally, which means their inferences about product quality are less predictive. Moreover, because expert consumers are aware of the *qualities* the product may render, those they expect at the point of purchase should reflect the product *qualities* they actually will experience upon product usage (Holbrook & Hirschman, 1982; Olson & Dover, 1978).

With the exception of Bredahl (2003) though, prior research efforts do not consider the effects of product-related experience on the evaluation of product quality at the point of purchase or during product usage. Nor do they present a conceptual framework that can explain how product-related experience influences both cue usage and product quality evaluations. We propose such a framework next (Section 12.3).

12.3 Conceptual model

To develop our conceptual model, we build on work by Grunert *et al.* (1996), Andersen (1994), Steenkamp and van Trijp (1996), and Zeithaml (1988). The model we propose in Figure 12.1 makes several assumptions.

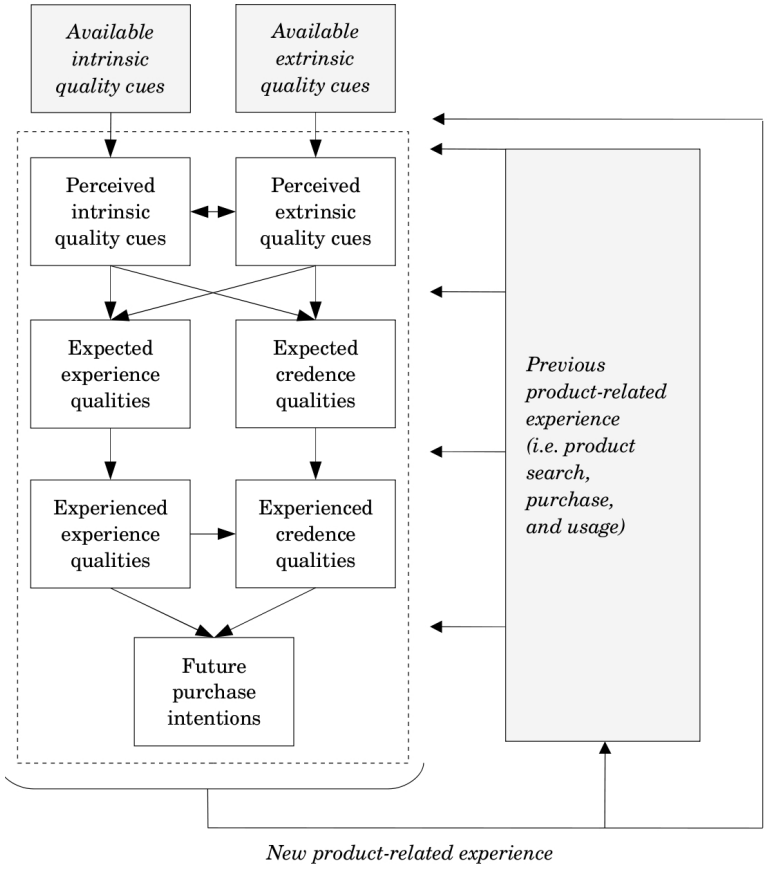
First, consumers evaluate product quality by activating knowledge structures that they have gained from previous product-related experience, and then use these structures to process product-related information.

Second, the model assumes that what consumers seek in a product are certain experience-providing *qualities* that the product should render, which we term *experience* and *credence* product *qualities*. *Experience* product *qualities* represent those that can be assessed only after

actual usage or consumption of the product, whereas *credence* product *qualities* cannot be certified even after consumption (Steenkamp, 1990).

Third, our model assumes that consumers, to evaluate these *experience* and *credence* product *qualities*, employ surrogate indicators of product quality, or *quality cues*, that they derive from an array of available product information by activating appropriate *schemata* that they have developed by accumulating product-related experience.

Figure 12.1: *Conceptual model.*



Quality cues that serve as indicators of product *qualities* might include physical aspects of the product, i.e. *intrinsic cues*, and/or intangible product-related cues, i.e. *extrinsic cues* (Olson & Jacoby, 1972). Activated *schemata* provide basic knowledge about a product and allow for the interpretation of individual quality cues that are relevant to that product. Thus, the level of prior product-related experience should influence how consumers use and apply quality cues when evaluating product quality.

Fourth, we assume that the accessibility and diagnosticity of the cues used depend on the level of prior product-related experience (Dick, Chakravarti & Biehal, 1990). Expert consumers should perceive stronger correlations between specific cues and expected product *qualities*, which should make their inferences more diagnostic of the quality experience. In contrast, novice consumers base their inferences on externally available cues and therefore form less predictive inferences.

Fifth, the model assumes that consumers can verify if certain expected product *qualities* correspond to their expectations after they use the product (Oliver, 1980). However, they can only verify *experience*, not *credence*, *qualities* (Steenkamp, 1990). This verification of the expected product *qualities* also depends on their prior product-related experience, such that expert consumers, because of their well-developed *schema* pertaining to certain experience-providing product *qualities*, should exhibit more predictive inferences about *expected qualities* that correspond better to the *experienced qualities*. The confirmation or disconfirmation of these expected *qualities* by the experienced *qualities* after product usage then should influence the intention to repurchase (Grunert *et al.*, 1996).

12.4 Method

12.4.1 Research overview

To investigate the influence of product-related experience on cue usage and product quality judgements, we rely on two principal considerations. First, we conduct this research in real market conditions with real products and interview actual consumers at the point of purchase. A real-life setting, compared with a controlled setting, does not place any limits on the amount or type of information that the consumer may search, an option that we consider particularly important for this study, in which we hope to compare the cue utilization processes of expert and novice consumers. Second, the focal product is a nondurable item, because consumers can evaluate its quality at both the point of purchase and after product usage in the same location. Therefore, the time lag between the product quality evaluations (i.e. expectations and experiences) is minimal.

12.4.2 Product selection

The main consideration guiding our study product selection was our desire that the product be appropriate as a stimulus for groups with different levels of familiarity. Greater familiarity could lead to product evaluations without external search. Therefore, we adopt fresh beef steaks as our appropriate, nondurable product. First, because of the natural biological variations in beef, consumers often have trouble evaluating the products, so even if consumers identify a certain product they have purchased before, they cannot be absolutely confident they will obtain the same quality (Grunert, Bredahl & Brunsø, 2004). Evaluations without any search will be rare. Second, because beef steaks share important features with meat in general (Bredahl, Grunert & Fertin, 1998), we can assume general product familiarity, important for identifying appropriate subjects. Third, beef steaks offer both intrinsic and extrinsic cues, so we can compare the use of both types of cues across the groups of consumers. Fourth, the fresh beef steaks we use as the focal product are from the *strip loin* muscle, which are popular among beef lovers because they are boneless, of the right size for an individual serving, and tender. Therefore, we should be able to identify real connoisseurs and more familiar consumers who purchase such steaks.

The beef steaks appeared in their usual places in the cooler after the supermarket's meat department had prepared and cut them, to enable consumers' visual evaluation in the cooling counter and to ensure that the steaks were all cut the same way. The beef steaks for tasting for this study were stored in a safe cooling place, then grilled at the supermarket, at a counter located opposite the beef cooling counter, with the appropriate equipment, and by a professional cook. All beef steaks were grilled in front of the respondents to a medium degree of doneness, without any seasoning.

12.4.3 Subjects

Subjects included regular beef consumers recruited at the point of purchase. The respondents thus can rely on knowledge they had acquired about similar beef products. The subjects are similar with respect to age, income, and social background, which may represent important factors for explaining search behavior (Savell *et al.*, 1989).

12.4.4 Independent measures

Following Bettman and Park (1980) and Park and Lessig (1981), we asked the subjects whether they had ever searched for information about, purchased, or consumed beef steaks from the strip loin muscle. Those who responded negatively to all three questions represented the novice group, whereas subjects who had searched for information, bought, and consumed such steaks became the expert group. Of the total sample, 64% of the respondents were expert consumers, that is, regular purchasers and users of beef steaks from the strip loin muscle. The other 36% were novice consumers who had never bought beef steaks from the strip loin muscle, though they regularly purchased and used other beef products. Therefore, we have 192 expert consumer observations and 108 novice consumer observations.

12.4.5 Dependent measures

We developed the measures for the quality cues and expected and experienced quality on the basis of results obtained from a Portuguese consumer survey (Aguiar Fontes *et al.*, 2008) together with findings from existing literature about beef quality perceptions (Bredahl, 2003; Brunsø *et al.*, 2005; Grunert, 1997; Steenkamp & van Trijp, 1996), see Subsection 2.4, Table 2.3, and Chapters 8 and 9.

Quality cues

Six quality cues provide information about how expert and novice consumers use and apply them in their product evaluations. Colour, fat, and cut provide the *intrinsic cues*, whereas brand, origin, and price offer *extrinsic cues*. This study measures quality cues on a seven-point evaluative scale (1 = absolutely dislike to 7 = absolutely like).

Expected and experienced quality

Taste, tenderness, and juiciness represent the *experience qualities*, and healthiness and nutrition offer the *credence qualities*. Similar to the quality cues, the experience and credence quality measures use a seven-point evaluative scale (e.g. 1 = not at all tasty to 7 = extremely tasty). To relate and compare their experienced to their expected beef quality, consumers considered the same *qualities* in both measures, with the same scale.

Future purchase intention

To measure *future purchase intentions*, we adopt a seven-point scale, on which 7 indicates a definite purchase in the future, and 1 corresponds to definitely no purchase.

12.4.6 Data collection

The data collection took place during spring 2007 in Lisbon, Portugal. We obtained the data from personal interviews with consumers at the point of beef purchase (i.e. in front of the cooling counter). Consumers were asked to participate in a half-hour market research interview, without knowing the nature of the experiment. They were not paid for their participation, except for receiving the beef steak to taste.

In the first phase, at the moment of purchase, we interviewed the consumers with respect to the intrinsic (i.e. colour, fat, and cut) and extrinsic (brand, origin, and price) product cues, expected product quality (taste, tenderness, juiciness, healthiness, and nutrition), and product-related experience (previous experience searching for, buying, and consuming beef steaks from strip loin muscle).

In the second phase, after they had tasted the beef, consumers indicated their experienced quality (again, taste, tenderness, juiciness, healthiness, and nutrition) and future purchase intentions. The final sample contained 300 valid observations, mostly from women (66%), between the ages of 31 and 50 years (61%), and with medium to high income levels (86%). Most of the respondents buy beef once a week (41%) or two to three times a month (41%), and they largely consume beef steaks several times a week (daily or two to three times a week = 53%). Because we want to investigate the relative differences between expert and novices consumers in their cue usage and product quality judgements, we believe this choice of subjects is justified, from the perspective of both statistical and internal validity.

12.4.7 Data analysis

For the analysis, we used multi-group structural equation modelling with LISREL 8.80. To assess the model fit, we considered the *chi-square* (χ^2), *root mean square error of approximation* (*RMSEA*), *goodness-of-fit index* (*GFI*), and *comparative fit index* (*CFI*). Following Byrne (1998), Jöreskog (1993), and Steenkamp and Baumgartner (1998), we undertook a three-step analysis.

Baseline measurement model analysis

Prior to testing for equivalence across consumer groups, we estimate the baseline measurement models for both novice and expert consumers, then test them for *convergent* and *discriminant validity* and *reliability* (Hair *et al.*, 2006). The factor loadings of the measured variables and construct reliability should be at least 0.7; the size of the correlations between the latent constructs should be smaller than 1. By estimating separate baseline measurement models for each consumer group, we gain insight into the validity of the measures, the number of factors, and the applicability of the framework to the analysis. This step is logical prior to *invariance* testing, because the number of factors should be equivalent across groups (i.e. *dimensional invariance*) before proceeding to any further test of *invariance* (Byrne, 1998).

Measurement invariance analysis

To make meaningful comparisons of the relationships between the constructs, we must confirm *measurement equivalence* (i.e. *invariance*) (Steenkamp & Baumgartner, 1998). We apply a *multigroup confirmatory factor analysis* (*CFA*) across consumer groups simultaneously and cross-validate the factorial structure of the measurement model (Byrne, 1998). That is, we assess measurement equivalence through *configural*, *metric*, *scalar*, and *factor invariance*, established on the basis of any changes in the overall model fit (de Jonge *et al.*, 2008).

Structural relationship analysis

Finally, on the basis of the validated measurement model and hypothesized conceptual model, we test the *structural model* using freely estimated path coefficients across expert and novice consumers. We then constrain all path coefficients to be equal across the two consumer groups and investigate whether the relationships differ. We again compare the models according to any change in overall model fit and the one-tailed probability of the chi-squared distribution.

12.5 Results

12.5.1 Baseline measurement models analysis

Prior to testing for measurement invariance across consumer groups, we must first to establish the baseline models for both expert and novice consumers, in which the cues are not treated as latent constructs. Instead, due to the underlying assumptions of the conceptual model, we evaluate the quality cues individually, and they directly influence quality expectations, as we show in Table 12.1.

Table 12.1: *Baseline measurement models for experts and novices.*

		Experts		***Novices***	
Latent constructs	***Indicators***	***Completely standardised loadings***[a]	***Item reliabilities***	***Completely standardised loadings***	***Item reliabilities***
Expected experience quality					
	Taste	0.89	0.79	0.85	0.72
	Tenderness	0.85	0.72	0.90	0.81
	Juiciness	0.85	0.73	0.83	0.69
Expected credence quality					
	Health	0.84	0.70	0.72	0.51
	Nutrition	0.80	0.65	0.85	0.73
Experienced experience quality					
	Taste	0.83	0.69	0.76	0.57
	Tenderness	0.75	0.57	0.84	0.70
	Juiciness	0.74	0.55	0.87	0.75
Experienced credence quality					
	Health	0.83	0.69	0.77	0.59
	Nutrition	0.79	0.62	0.74	0.55
Future purchase intention					
	Intention to buy	0.86	0.74	0.84	0.70

[a] All significant at $p<0.05$.

The same measurement model fits the data for both experts and novices, in support of *dimensional invariance*, and the final baseline measurement models show satisfactory overall fit. Specifically, the overall fit of the experts model is as follows: $\chi^2(31)=33.28$ ($p=0.36$), $RMSEA=0.016$; $GFI=0.97$, and $CFI=1.00$. The fit for the novices indicates the following: $\chi^2(35)=36.01$ ($p=0.42$), $RMSEA=0.016$; $GFI=0.94$, and $CFI=0.99$. In addition, both models reveal satisfactory *convergent* and *discriminant validity* and *reliability*. In both models, the factor loadings of the items are all greater than 0.7 and significant; *composite reliability* is greater than 0.7; and the size of the correlations between the latent constructs is less than 1.

12.5.2 Measurement invariance analysis

As we show in Table 2, beef quality can be well described by the five-factor model that consists of *expected experience and credence beef qualities*, *experienced experience and credence qualities*, and *future purchase intentions* among both expert and novice consumers.

Table 12.2: *Measurement invariance analysis.*

	χ^2	***df***	***RMSEA***	***CFI***
Configural invariance	77.370	66	0.034	0.995
Metric invariance	87.800	72	0.038	0.993
Scalar invariance	109.310	83	0.046	0.988
Factor covariance invariance	134.840	93	0.055	0.981
Factor variance invariance	141.650	98	0.055	0.980
Error variance invariance	157.250	108	0.055	0.978

Although the observed items are equivalent across experts and novices, *factor covariance invariance* differs between consumer groups ($\Delta\chi^2$=25.53, p=0.004). However, the models still fit the data well and provide reasonable evidence in support of *measurement equivalence* for the two consumer groups. These results permit a meaningful comparison between expert and novice consumer groups on the structural relationships of the five constructs.

12.5.3 Structural relationship analysis

Finally, we estimate the structural model on the basis of the hypothesized conceptual model in Figure 12.1. Because our *measurement invariance analysis* indicates the covariances between the constructs differ across expert and novice consumers, and because the path coefficients in a structural model are simple deterministic functions of these covariances, we freely estimate the path coefficients for the two consumer groups. The structural model also includes *intrinsic* and *extrinsic quality cues*, which influence *expected experience and credence qualities* directly and individually. Thus, we estimate these path coefficients freely, together with the path coefficients between the constructs.

The structural model in which we set all path coefficients free across expert and novice consumers yields good overall fit ($\chi^2(190)$=300.22, *RMSEA*=0.062; *GFI*=0.92, and *CFI*=0.97). When we then constrain all path coefficients to be equal across expert and novice consumers, the model fit deteriorates significantly ($\Delta\chi^2(17)$=49.44, p=0.001). If we relax the path coefficients one by one (all other parameters held equal), we can determine, according to the change in overall model fit, which path coefficients differ between the consumer groups.

Specifically, we identify path coefficients between *colour* and *expected experience quality* ($\Delta\chi^2(1)$=10.00, p=0.002), *brand* and *expected experience quality* ($\Delta\chi^2(1)$=9.84, p=0.002), *price* and *expected experience quality* ($\Delta\chi^2(1)$=5.61, p=0.018), *price* and *expected credence quality* ($\Delta\chi^2(1)$=11.29, p=0.001), and *expected* and *experienced credence quality* ($\Delta\chi^2(1)$=7.01, p=0.008) as different between expert and novice consumers.

The final structural model for expert and novice consumers, in which we hold all structural parameters equal while relaxing the path coefficients that differ across consumers, also results in a satisfactory overall fit ($\Delta\chi^2(202)$= 312.91, *RMSEA*=0.060, *GFI*=0.92, and *CFI*=0.97). We provide the standardized path coefficients in Table 12.3.

We find marked differences between expert and novice consumers, both of which use intrinsic and extrinsic cues but in different ways and for different purposes. Expert consumers use their knowledge to respond deductively and mostly employ meat *colour* to predict the *experience*

quality of the product (γ=0.47, t=6.72). Novices instead appear to believe that a relationship exists between *brand* and *experience quality* (γ=0.38, t=5.00). Both *colour* and *brand* have greater influence on *expected experience quality* than do other cues.

Table 12.3: *Final structural model for expert and novice consumers.*

	Experts		***Novices***	
Relationship	***Path estimates***[a,b]	***t-value***	***Path estimates***	***t-value***
Expected experience quality				
Perceived colour	***0.47***	***6.72***	***0.15***	***2.04***
Perceived cut	0.07	1.43	0.07	1.43
Perceived fat	0.15	2.99	0.15	2.99
Perceived brand	***0.21***	***2.69***	***0.38***	***5.00***
Perceived origin	0.12	2.16	0.12	2.16
Perceived price	***0.13***	***2.16***	***-0.13***	***-2.36***
R^2	0.61		0.55	
Expected credence quality				
Perceived colour	0.11	1.55	0.11	1.55
Perceived cut	0.01	0.22	0.01	0.22
Perceived fat	0.00	0.07	0.00	0.07
Perceived brand	0.27	3.40	0.27	3.40
Perceived origin	0.07	0.90	0.07	0.90
Perceived price	***0.27***	***3.41***	***-0.13***	***-2.06***
R^2	0.26		0.19	
Experienced experience quality				
Expected experience quality	0.37	5.74	0.37	5.74
R^2	0.15		0.10	
Experienced credence quality				
Expected credence quality	***0.57***	***5.88***	***0.21***	***2.00***
Experienced experience quality	0.29	4.32	0.29	4.32
R^2	0.42		0.19	
Future purchase intention				
Experienced experience quality	0.93	12.92	0.93	12.92
Experienced credence quality	-0.15	-2.50	-0.15	-2.50
R^2	0.86		0.76	

[a]Gamma and beta standardized path coefficients, those significant at 0.05 level are in italic.

[b]Bolded path coefficients are significantly different across consumers.

The influence of *price* on *experience quality expectations* also differs across the consumer groups: It is positive for experts, such that a higher *price* implies higher *expected product quality* (γ=0.13, t=2.16), but negative for novices (γ= -0.13, t= -2.36). We observe similar differences for experts and novices with regard to *credence quality expectations*. Again, experts use *price* as a quality indicator (γ=0.27, t=4.41), whereas novices relate *price* negatively to *expected credence quality* (γ= -0.13, t= -2.06).

The information processing undertaken by novices thus appears driven mainly by externally available cues. Rather than engaging in deeper information processing, novices respond inductively and use available information to draw conclusions about product quality. *Brand* provides the main information to infer product quality, because these consumers lack stored knowledge about intrinsic product *qualities*.

Moreover, novices consider *price* negatively; they are not certain and lack knowledge about a positive relationship between *price* and *product quality*. Thus, experts and novices differ with respect to not only their use of intrinsic and extrinsic cues but also the inferences they make. Previous product-related experience influences the use of extrinsic and intrinsic cues, in support of our model assumptions.

For experts, the observed latent constructs offer greater explained variance (*expected qualities*: experience R^2=0.61, credence R^2=0.26; *experienced qualities*: experience R^2=0.42, credence R^2=0.15).They possess more information about the product's experience-providing *qualities*, which appears to make them better able to infer product quality. These inferences also are more diagnostic of the experienced product *qualities*. Finally, as we expected, *future purchase intentions* depend greatly on experienced experience quality in both consumer groups, though it can be better explained among experts (R^2=0.86).

Our proposition that experts process more intrinsic and extrinsic cues that are relevant for product quality evaluation, which results in more diagnostic inferences at both the point of purchase and after product usage, therefore receives confirmation.

12.6 Discussion and conclusion

We use multivariate statistical methods to assess the impact of consumers' product-related experience on cue usage in product quality judgements at the point of purchase and upon product usage. The results of this study, undertaken with a nondurable product and Portuguese consumers, corroborate findings and suggestions from previous research, namely, that product-related experience influences the extent to which consumers acquire intrinsic and extrinsic cues, as well as the way they use them in their product quality judgements (Park & Lessig, 1981; Raju, Lonial & Magold, 1995; Savell *et al.*, 1989). Therefore, the diagnosticity of their inferred product *qualities* at the point of purchase and upon product usage also differ (Dick, Chakravarti & Biehal, 1990).

Experts, compared with novices, use more intrinsic cues and mainly consider steak colour when they assess experience product quality. This method may reflect their knowledge of a relationship between experience product quality and colour. As Alba and Hutchinson (1987) and Brucks (1985) note, expert consumers look for some information simply because they are aware of the existence of those attributes.

Likewise, this finding supports previous research by Park and Lessig (1981), Raju, Lonial and Magold (1995), and Bredahl (2003), which suggests that intrinsic cue usage increases with more product-related experience or familiarity. Furthermore, this result indicates that colour might provide accurate predictions of expected experience quality for expert consumers who are real connoisseurs of the products they buy and know what to look for in a piece of beef. With more experience, direct correlations may form in experts' memory (Kardes, Posavac & Cronley, 2004) between colour and expected experience quality. This finding aligns with Dick, Chakravarti and Biehal (1990) *accessibility-diagnosticity theory*.

The results instead indicate that novices use more extrinsic quality cues, especially brand, to assess experience product quality because they believe in a relationship between brand and product quality. In part, this belief may be a consequence of their inexperience. Novice consumers have no relevant cues to recall about the product, because they are not aware of their existence and instead base their evaluations on more shallow, external information (Alba & Hutchinson, 1987). Although the novice consumers in our study are inexperienced about the particular beef cut, they are regular beef purchasers. Therefore, they may have learned, from purchasing and consuming other beef products, that brand correlates with some experience

qualities; therefore, they use their comparatively minimal knowledge to generalize to the whole beef category (Joiner & Loken, 1998; Osherson *et al.*, 1990). Novices thus appear to base their evaluation of experience product quality on simplified heuristic strategies, with brand as the significant shortcut, to summarize substantial information about the product (Kardes, Posavac & Cronley, 2004; Zeithaml, 1988). For novices then, brand may reduce purchase risk.

Another key finding reveals that both experts and novices use price as an indicator of experience and credence product quality, though in different manners. Experts use price as a quality indicator, such that higher price implies higher expected product quality; this relationship is opposite for novices, who infer a negative relationship between price and product quality.

First, novices are unaware of the product's price, because they have never purchased it before and do not have such information in memory. Second, brand provides a cue of expected beef quality, so novices compensate for their perceptions of brand superiority with an apparently inaccessible or unknown cue. Previous findings (Chernov & Carpenter, 2001) suggest consumers engage in such compensatory perceptions when they believe the market is efficient and when other perceptual bases, such as knowledge of specific interattribute correlations, are unknown. However, these compensatory perceptions likely form only in some limited conditions, because negative correlations are complex to learn and understand (Kardes, Posavac & Cronley, 2004).

Finally, we find that expert consumers, due to their more elaborate product knowledge, tend to use more relevant intrinsic and extrinsic cues to evaluate product quality, which provides them with more favourable and diagnostic product inferences. As Olson and Dover (1978) posit regarding accumulated product-related experiences, consumers achieve a meaningful interpretation of the product through the lens of some comprehensive framework or *schema*. Their resulting memory structure likely entails more frequent purchases and usage of the product, which gives experts easier access to appropriate product *schema* and the acquisition of information that is relevant to and diagnostic of product quality. With greater accessibility of product information in their memory, experts develop stronger perceived correlations between known cues and expected product *qualities*, which results in more diagnostic product quality inferences (Dick, Chakravarti & Biehal, 1990).

Although these results provide some new insights, we call for more research to investigate the influence of knowledge caused by product-related experience for various product categories and situations. An examination of the influence of product-related experience on the relationship between product quality evaluations at the point of purchase and at product usage at home, as well as how this relationship influences buying behavior, would be especially pertinent.

It might be very interesting to investigate quality evaluations immediately, as we have done by asking respondents to taste the beef at the supermarket, and in a real-life environment, then compare those evaluations to observe the effects of product-related experience. Research also should assess other factors that might moderate consumers' memory-based evaluations, such as involvement, motivation, or confidence. Gaining a better understanding of the factors and processes that influence consumers' memory-based product evaluations would give food providers a means to address consumers' expectations and achieve a sustainable competitive advantage in the marketplace.

In this study, we differentiate consumers into only two categories. With larger samples, researchers might distinguish among more than two levels of knowledge and observe the impact

of product-related experience in more detail. In addition, measuring product quality judgements after product usage at home could clarify some differences between consumers with different levels of product-related experience.

Part V

Conclusion

Our responsibility is to do what we can, learn what we can, improve the solutions, and pass them on.

- Richard P. Feynman -

If having a customer orientation is central to marketing effectiveness, studying how consumers perceive the quality of products and services is undoubtedly important.

- Harish Sujan -

13

General discussion and conclusion

The present research has provided major insights into the overall framework of the Portuguese consumers' beef quality perception process, as well as in the mechanisms guiding this process. In this research, a quantitative consumer survey with personal interviews was used to understand and identify relevant beef quality attributes for the Portuguese consumer. Subsequently, a combination of purchase-intercept and blind-taste survey methods, that is a *framed field experiment*[1], was employed in order to investigate the consumers' quality perception process taking place during the purchase and upon consumption of beef. The research was set in a real-life purchase environment and was based on a group of genuine beef consumers in Portugal. In principle, the results of this research have implications in three areas[2]:

- ***methodological implications*** for the usefulness of the combined purchase-intercept and blind-taste methods for the analysis of the quality perception processes (***Chapters 10***, ***11*** and ***12***);

- ***theoretical implications*** for the knowledge of the consumers' product quality perception process (***Chapters 11*** and ***12***), as well as, for the model employed, the *Total Food Quality Model-TFQM* (Figure 2.11), and other models regarding an integrative approach to consumers' quality perception process (Section 2.3.4); and

- ***practical implications*** for the marketing of beef in Portugal (***Chapters 4*** through ***12***).

[1]There are three types of field experiments: *artefactual*, *framed*, and *natural*. *Artefactual field experiment* mimics a lab experiment although using typically experimental participants from the market of interest. *Framed field experiment* is the same as the *artefactual* one, although it is done not only with the naturally-occurring populations, but also within naturally-occurring environment with respect to the commodity, task, stakes, and information set. *Natural field experiment* is the same as a *framed field experiment*, but where the subjects do not know that they are in an experiment (Harrison & List, 2004).

[2]The major *methodological* and *theoretical* contributions of this research are attributed namely to ***Chapters 10***, ***11***, and ***12***, while major *practical* contributions are accredited to everything else (***Chapters 4*** through ***12***).

13.1 Methodological implications

The present research has been using a combination of purchase-intercept and blind-taste approaches, i.e. *framed field experiment*, to analyse consumers' product quality perception process, which has not been applied in the consumer research until now[3], and which deviates in a number of ways from the more traditional methods usually applied in the consumer study (Steenkamp & van Trijp, 1996; Bredahl, Grunert & Fertin, 1998).

- Firstly, and most importantly, the purchase-intercept technique combines both in-store observations and in-store interviewing to assess consumers' product quality perceptions and factors behind this process. Hence, the observation of the respondents while making a product purchase, and their interviewing as soon as the purchase has been made, brought several positive aspects to the study (Malhotra, 2007; Aaker, Kumar & Day, 2004; McIntyre & Bender, 1986):
  - the research is undertaken in a real-life environment without disturbing the habitual purchase settings,
  - the respondents are easily located,
  - the respondents are really product purchasers, from representative population,
  - the respondents can verify and assess the product in a real-purchase comparative context,
  - the time-gap between purchase and data collection is minimised,
  - natural set of memory cues for the respondent is provided, while the purchase is still silent,
  - the diversity of questions can be asked in a more efficient way,
  - the hypothetical questions on different product brands can be assessed in a more realistic way, and
  - respondents are not influenced by other family members.

  The research has overcome the possible limitations of the purchase-intercept method, related to control of interviewers, interviewer-respondent interaction bias, speed of the respondents' interview, and obtainment of sensitive information from the respondent, by previous training of interviewers and supervision of consumer trials.
- Secondly, the employed purchase-intercept approach not only permitted respondents to *see* and *handle/feel* the product, but also allowed for *physical stimuli* to be used in the following blind-taste test settings, where respondents could *consume/taste* the product before they provide meaningful information.
- Thirdly, the reality that the blind-taste test has been engaged right after the purchase-intercept approach, at the purchase point, achieves a reduction in the time-lag between two evaluations, that is evaluation of product quality during the purchase and upon product consumption. Blind-taste test overcomes in various ways disadvantages of its alternative method, that is in-home taste test[4] (Birn, Hague & Vangelder, 1990; Dransfield *et al.*, 2000; Wood *et al.*, 1995):
  - the respondents can test more than one product each time,

[3] To our knowledge, and with regard to beef, only one study by Bredahl (2003) has applied the purchase-intercept technique, however in combination with in-home taste test and not blind-taste test.

[4] In-home product test represents a research method where products are delivered to consumers' homes and are left there for both preparation and evaluation by the consumers.

  - large number of responses achieved in a relatively short period of time,
  - direct comparisons between products can be made,
  - respondents are not influenced by other family members during the meal, the *family halo* effect, and
  - the cooking procedures are controlled.

  This last positive aspect of blind-taste test regarding cooking procedures is of crucial importance for fresh products, like beef, as the way how the product is prepared may significantly influence consumers' eating experience (Oliver *et al.*, 2006).

- Fourthly, the implementation of a combination of purchase-intercept and blind-taste methods in the field context, i.e. *framed field experiment*, in the research, which represents a very useful marriage between laboratory and naturally-occurring data, allows for a much deeper and broader exploration of consumers' quality perception phenomena, collecting facts useful for constructing this theory, and organising data to measure key parameters. Beyond testing theory, this approach represents a mixture of control and realism, not usually achieved in the lab or with naturally-occurring data, and in that way, these kind of field experiments permit the researcher to address questions that are sometimes quite difficult to answer (List, 2009). Thus, an array of dependent measures on which more than one product was to be rated by the respondent, was assessed in the naturally-occurring environment, resulting in covariance matrices that permit estimation not only of how various quality cues affect quality expectations during purchase, but also how the quality expectations are related to quality experience, and its implications to future purchase, as well as how various elements of the quality perception process are related to each other.
- Finally, the evaluation of the consumers' beef quality perception process by using *structural equation modelling* (*SEM*) allowed for a simultaneous investigation of composites of and relationships between perceived intrinsic quality cues, perceived extrinsic quality cues, expected quality, experienced quality and, finally, future purchase intention. Even though this is a suitable technique for a one-stop testing the entire theory, this method is rarely employed for the analysis of consumers' quality perception process. Other multivariate techniques, such as *multiple regression* and *canonical* analysis, although they provide the researcher with powerful analysis tools, they all share a common limitation - addressing of a single relationship at a time, and even when they allow multiple dependent variables, it still represents only single relationships between dependent and independent variables (Hair *et al.*, 2006).

The outcomes of the research have been very encouraging in the sense that the obtained data led to results with meaningful interpretations, reasonably well explained variances and satisfactory goodness of fit measures in the models, what adds to its validity. Finally, the application of the *framed field experiment*, that is purchase-intercept technique and blind-taste test, in this research, is also a good example of using the combined methods to look at the differences between different consumers' segments based on other pre-specified criteria, like different brands or degree of previous product-related experience.

13.1.1 Methodological limitations

The main methodological limitation of the present study lays in the fact that the considered sample of the Portuguese consumers is special. In other words, it is biased towards higher

income and literacy levels, thus limiting the extrapolation of the research results to Portuguese population. This limitation could be mended by enlarging the sample and by using less priced beef products accessible to a wider consumer population.

Another methodological limitation worth mentioning is the fact that the study was conducted only with regard to the supermarket environment, while the butcher shop was disregarded. This limitation could be healed by conducting a similar study at the butcher shop and the obtained results could be compared with the results of this study.

In addition, even though research design included in-home evaluation of the Portuguese consumers' beef quality experience, this was not presented in this thesis, and is a matter of the future research.

13.2 Theoretical implications

The conceptual approach of this research has a number of *theoretical implications* for consumers' product quality judgement analysis (***Chapters 11*** and ***12***), as well as for the models employed, (Figures 2.11 and 12.1) and other models of the integrative theory (Section 2.3.4).

- Firstly, the interrelations between *extrinsic* and *intrinsic cues* have been investigated where it was suggested that quality cues are not in fact independent, i.e. that consumers do not form perception of *intrinsic cues* independently of *extrinsic cues*, but rather that the perception of quality cues represents a *cognitive web* where cues interact (***Chapters 11*** and ***12***). The perceived *extrinsic cues*, as it turns out in this research, are a subjective measure of overall product attractiveness based on externally available information, which affects both *intrinsic cues*, and consequently quality expectations of the product. Even though, this phenomenon was recognised a long time ago (Cox, 1967b; Zeithaml, 1988), it is rarely explored and integrated into models of food quality perception (Grunert, 1997).

- Hence, perceived *extrinsic cues* needed further examination, which was undertaken in this research. Besides adaptation of the *total food quality model* (*TFQM*), where the distinction was made between product quality evaluation at the point of purchase and after blind-tasting evaluations, the present research further extends the *TFQM* by showing three examples of interaction among quality cues (***Chapter 11***). Thus, three different models, as a variation of the *TFQM*, have been postulated and tested.

  - In the first model, it is suggested that *intrinsic* and *extrinsic cues* freely correlate and directly affect expected quality, which is related to experienced quality, and consequently to future purchase intentions (Figure 11.2).
  - In the second model, it is implied that consumers form an overall evaluation based on the physical appearance of the product, which further impacts on quality expectations rather than individual cues; and similarly that consumers form an impression of overall attractiveness based on the externally available information (Figure 11.3). Thus, it is investigated how quality cues mediated by its constructs, i.e. *intrinsic* and *extrinsic*, influence expected quality, as well as how perceived *extrinsic cues* influence perception of *intrinsic cues*. The other relationships stayed the same as in the first model.

  - Since, from the second model, it is not clear which *extrinsic cues* have a higher influence on the perception of *intrinsic cues*, as *extrinsic cues* are related to its latent construct, the third model showed how various *extrinsic cues* directly influence perception of *intrinsic cues*, and further impact on product quality expectations, keeping the other relationships the same (Figure 11.4).

  Most importantly, these three variants of the *TFQM*, by showing different types of information, allowed for a better understanding of consumers' cue utilisation, and usage of *extrinsic cues* in particular, as well as their impact on product quality perception process. The testing of the models showed significant results with satisfactory models' fit, underlying and validating the postulated theory.

- Thirdly, the conceptual model of product quality judgement has been proposed, Figure 12.1, using as a starting point work by Grunert *et al.* (1996), Andersen (1994), Steenkamp and van Trijp (1996), and Zeithaml (1988), Section 2.3.4. This model shows how product-related experience impacts cue usage and product quality judgement. Despite the fact that it has been acknowledged that product-related experience affects information processing (Rao & Monroe, 1988; Park & Lessig, 1981), this reality has been almost unexplored with regard to the consumers' perception process of food quality (Bredahl, 2003).

- Therefore, and fourthly, it was suggested that the multiple product-related experience lead to better developed cognitive structures or knowledge *schemas* concerning the product, that further influence the consumers' quality perception process in various ways:

  - expert consumers, as they have more developed knowledge *schemas*, i.e. multiple product-related experiences, use both intrinsic and extrinsic cues, with greater emphasis on intrinsic cues;
  - novice consumers, as they are less experienced with the product, use more of extrinsic cues compared to intrinsic cues, when evaluating product quality;
  - in comparison to novices, expert consumers process more of those intrinsic and extrinsic cues, which are relevant for product quality evaluation; and thus,
  - expert consumers show more predictive evaluations of product quality, both at the point of purchase and upon product usage, when compared to novices.

  The obtained results of the present research corroborate suggestions from the hypothesised conceptual model, i.e. that product-related experience impacts the extent to which consumers' acquire different intrinsic and extrinsic cues, as well as the way they use them in product quality judgement, resulting in differences in diagnosticity of the inferred product *qualities* both at the point of purchase and upon product usage (***Chapter 12***). Thus, when observing the consumers' quality perception process it is of outmost importance, as it shows, to consider consumers' product-related experience.

Finally, research supplying a better understanding of consumers' quality perception process takes into account the consumers' decision-making needs and limitations prevalent in this process. A few of such areas, regarded as promising, have been answered in this research, contributing to the knowledge on consumers' quality perception process.

13.2.1 Theoretical limitations

One of the theoretical limitations of the present study is the fact that the Portuguese consumers' beef quality expectations, formed in the real market environment, are related only to the beef quality experiences obtained in a controlled setting (i.e. at the supermarket), and not to those obtained in a real consumption situation (i.e. at home). Moreover, the relation between Portuguese consumers' beef quality experiences inferred in the controlled setting and in the real consumption situation was also not analysed in this study. These will be answered in future studies, that are intended to be developed.

The other theoretical limitation is that the objective beef quality is not related to the beef's intrinsic characteristics and sensory quality. The data about objective quality of beef was gathered, however, it did not allow for a direct comparison with the beef's intrinsic characteristics and sensory quality, as the collected beef samples were not corresponding to the samples used throughout the trails. Thus, this question still remains to be answered.

The particularity of the Portuguese consumers' sample, used in this study, did not allow for the analysis of the effects of the demographic and resource household characteristics on the Portuguese consumers' beef quality perception process, as the sample was very homogeneous in these variables. This limitation could be mended by enlarging the sample.

13.3 Practical implications

The way Portuguese consumers eat is changing. In the beef sector, as well as in other food sectors, several major changes have been recognised.

- A steady stream of changes in Portuguese consumer behaviour with a decreasing trend towards food at home and an increasing trend towards food away from home has been found. Here, factors like smaller households, working mums, greying of population, as well as income, and education influence consumers' food expenditure patterns. Nevertheless, meat and beef still hold an important share of Portuguese consumers' household food expenditure at home (***Chapter 4***).

- Even though meat in general, and beef in particular, still take a central element in the Portuguese diet and household spending, the role of meat and beef has been affected by changes in meat consumption, changes in the way how meat consumption is distributed across different kinds of meat, and by specific changes in consumers' perceptions towards meat, often linked to meat-related food scares, like *BSE*, *TSE*, and *nitrofurans* crises. More specifically, results suggest that while Portuguese consumers' pork consumption increased, beef consumption suffered a decline with *BSE* outbreak, leaving Portuguese beef consumption levels always bellow EU average (***Chapter 5***).

- The fluctuations in meat and beef consumption were found as indisputable, where empirical results have suggested that the *BSE* crisis had an instantaneous effect on the Portuguese consumers' beef demand, and confirmed the substitution effect within the meat group. Portuguese consumers' beef consumption levels were found not to be recovering immediately to the levels before *BSE* crisis, but rather tend to slowly recuperate the previous pattern. Interestingly, demand for convenience was found as one of the important

factors influencing consumers' meat consumption, where poultry meat respond the most to this purchase motive (***Chapter 6***).

- The changing of Portuguese consumers' habits and decline in beef demand relative to the other meats, due to the *BSE* and other crises, brought forward the need for innovation in the meat sector, namely through beef branding, as a way to survive. Hence, it has been shown that the Portuguese beef sector is moving towards producing beef more in accordance with these requirements. In this respect, increase in both quantity and value has been observed for quality labelled beef, while this trend was rather opposite for undifferentiated beef (***Chapter 7***).

In the midst of these gradual alterations regarding the beef sector and Portuguese consumers, the results of this research bring a number of *practical implications* for beef marketing in Portugal. Figure 13.1 summarises some of these results considering Portuguese consumers' beef quality perception. Notice that this sample does not allow to extrapolate obtained results to the overall Portuguese population. Nevertheless, in ***Chapters 4*** and ***9*** it was confirmed that consumers with medium to higher income and higher literacy levels are the ones who more often purchase and consume beef in general, and quality differentiated beef in particular.

- Firstly, the empirical evidence showed that Portuguese consumers perceive beef quality as two-dimensional, and that the main dimensions are *sensory* and *credence* dimensions. First dimension consists of *qualities* like taste, tenderness, and juiciness, and later of nutrition, healthiness, and safety. Even though during the purchase phase, Portuguese consumers consider both *sensory* and *credence* dimensions of beef quality, in the experience phase the *sensory* dimension has more weight and influences future beef repurchases (see ***Chapters 10***, ***11*** and ***12***).

- Secondly, among beef quality attributes, *tenderness* has been suggested as one of the most important *sensory* attributes among Portuguese consumers. Moreover, sensory analysis confirmed that it is possible to differentiate beef based on this attribute (***Chapter 8***). This is likewise confirmed by the consumer trials, where *tenderness* was suggested as the attribute on which consumers, in the experience phase, differentiate and valorize beef (***Chapter 10***, Table 10.7). Nevertheless, *taste* is also suggested as an important *sensory* attribute when evaluating beef quality (***Chapter 9***).

- Thirdly, *safety* has been found as one of the *credence* quality attributes on which Portuguese consumers differentiate beef (***Chapter 10***). The other *credence* attribute pointed out was *health* (***Chapter 9***). As consumers have no possibility of actually experiencing the presence of, for example, a certain degree of *safety* or *healthiness* in a product, the credence-related quality is a question of credible communication, highlighting the importance of traceability or other product information as brand and origin.

  Hence, *sensory* properties of beef are still the prime consideration in Portuguese consumers' choice, however, *credence* properties are also considered in the purchase phase. Thus, if one looks at beef quality as a matter of communication, previous findings open up some pathways for the acceptance or rejection of beef products in Portugal. More specifically, if credible information about *tenderness* and *safety* properties of beef may be

established and properly communicated, it may further evolve a life of its own, as consumers may use it in product quality perception, inferring quality dimensions beyond those actually covered by the communicated information. Undoubtedly, the communicated information must be trustworthy, consistent, and supported in the quality experience phase. This is of great importance for beef, since consumers use *sensory* characteristics, as *tenderness*, to infer *credence* characteristics, which cannot be perceived under consumption (***Chapters 10*** and ***11***).

Therefore, a valid pathway for the acceptance of a particular beef product by Portuguese consumers would be: (i) to wrap the beef offerings in context of a *story* (i.e. *communication strategy*) conveying those *qualities* consumers regard as important; (ii) to make the *story* tangible allowing for consumers to sense communicated *qualities* in the consumption phase, and (iii) to make the *story* personal developing stronger consumers' attitudes towards the product. In this way not only the acceptance of the particular beef product may be assured, but also an eventual negative consumers' opinion about this product *may be potentially changed*.

- Fourthly, as these *credence* and *sensory* beef *qualities* cannot be inferred at the point of purchase, consumers use available product information. The results showed that Portuguese consumers distinguish between two types of *cues* - related to the physical part of the product - *intrinsic cues*, as fat and cut, or - related with everything else - *extrinsic cues*, as origin and label information. However, *price*, though an *extrinsic cue*, is often considered by Portuguese consumers as a factor apart (***Chapters 9*** and ***10***). It has been suggested that *extrinsic cues* are used both for evaluation of beef quality and *intrinsic cues* (***Chapter 11***). Thus, it seems that there is a growing importance of *extrinsic cues* among Portuguese consumers, which if properly used in the marketing of beef to point out certain product *qualities*, may have quite significant consequences. In other words, *extrinsic cues* as brand, country of origin, and information on animal production have been shown to have significant effects regarding product quality perception, meaning that consumers tend to believe that, for example, national branded beef with a traditional production method is better not only in terms of its intrinsic characteristics, but also in terms of *sensory* and *credence qualities* (***Chapter 10***, Tables 10.5 and 10.6). This perception of *extrinsic cues* (if strongly held by the consumer) may even overcome potentially disconfirming experience in the consumption phase, if differences between the *sensory* characteristics of other meat alternatives are not too big (Grunert, 2006).

- Finally, one cue seems to dominate the perception of both *sensory* and *credence* beef quality, as well as perception of *intrinsic cues*, and that is *brand*.

  The results showed that *brand* is the predominant extrinsic cue among Portuguese consumers, where they use it both for perception of intrinsic cues and for inference of beef quality expectations (***Chapter 11***). Branding have been known for a long time as the obvious way in which a seller can signal a superior product quality and even encourage consumers to pay a premium for better quality (Grunert, Bredahl & Brunsø, 2004). In the case of beef, branding is rarely employed, thus the present results have a quite significant implications for beef marketing. Specifically, the results show that branding could play a major role in the marketing of differentiated meat products in Portugal, as Portuguese

consumers are very receptive to the brand signal and utilise it in their quality perception process of beef. This is true regarding all consumers, and even for those consumers who are not familiar with the product (***Chapter 12***).

However, marketeers should pay attention to the fact that, for the sample in question, consumers prefer national branded beef[5] over store branded beef[6], showing that even though brand is the major quality signal, only when brand, related to specific product characteristics and production methods, is considered by consumers as credible and as predictive of higher beef quality, may it have an impact in the marketplace. Brands lacking the relevant product-related information and not consistently positioned, might lead consumers to perceive them as of lower value, when compared to those products with a well-known brand name, as used in this research (***Chapter 10***). Moreover, if brand is regarded as credible it further allows for consumers to learn from their experience, that is, if consumers like the quality they have experienced, they may come back and repurchase the brand (Grunert, Bredahl & Brunsø, 2004). Hence, consumers in this way may become experts on the matter, where their information processing is facilitated and confidence increased when evaluating the piece of meat. Here, consumers may look beyond the horizons of information available externally and use other cues, as *colour* to infer beef quality (***Chapter 12***). On the other hand, if consumers do not like the quality they have experienced, that is, if the information underlined by the brand is not confirmed upon consumption, consumers may simply avoid the brand, and punish its producer/distributor. Most importantly, if the brand claims are reliable and consistent over time, that is, if the brand always offer the same reliable quality, this history of consistency may ensure quality positioning of this brand in the mind of consumer, and brand equity will be developed (Erdem & Swait, 1998).

Other cues worth mentioning here are *colour*, *fat*, *origin* and *price*. *Colour* is the other cue regarded as important in these consumers' beef quality perception process (***Chapter 11***). *Colour* is mainly used among expert consumers to successfully infer sensory quality of branded beef (***Chapter 12***). This adds to the previous claim that *brand* allows consumers to learn from their experience, not only concerning the link between *brand* and certain *sensory qualities*, but also about the link *brand* → *colour* → *sensory quality*.

Fat is a beef attribute in which Portuguese consumers are interested in, and which they use as a predictor of both *sensory* and *credence* beef *qualities* (***Chapters 8*** and ***11***). Marketeers should be aware of the fact that, as it seems, and for this sample, Portuguese consumers, quite opposite to consumers from other EU countries (Grunert, 1997; Brunsø *et al.*, 2005), posses certain knowledge that some degree of *intramuscular fat* actually contributes to beef quality[7]. This finding is important, as *fat* in beef has often been found in other consumer studies to be poorly correlated with eating *qualities*, and considered to convey quality (Bredahl, 2003; Grunert, Bredahl & Brunsø, 2004).

Origin of the beef is another cue worth mentioning. Portuguese consumers regard origin

[5]Nationally branded beef refers to the *Carnalentejana* brand. Notice that Carnalentejana beef also carries a *PDO* quality label. However, due to the fact that the majority of the Portuguese consumers do not know what *PDO* label stands for (see ***Chapters 8*** and ***9***), only brand name of this beef was considered in the research.

[6]Store branded beef refers to a brand of the supermarket chain.

[7]Notice that this is a sample of highly educated and experienced beef consumers.

as a significant cue in the perception of beef quality and prefer domestic beef over imported one (***Chapters 9*** and ***10***). Specifically, they consider *origin* as a sign of better beef intrinsic attributes, such as *colour* and *fat*, and of higher expected *sensory* quality (***Chapter 11***). This obvious effect of *origin* on both intrinsic cues and expected quality poses an anchor to the marketeer of superior beef. In other words, if a producer is able to produce beef which actually is superior in terms of the *sensory* quality aspects (Portuguese consumers are interested in) this could be communicated to the consumers with satisfactory results to both sides (***Chapters 8***, ***9*** and ***10***). Thus, this would help both suppliers to communicate their product superiority and consumers to infer product quality with a higher validity.

In the end, a final distinctive cue for Portuguese consumers is *price*. *Price* was suggested to be still an important factor for Portuguese consumers when buying and evaluating beef quality (***Chapters 8*** and ***11***). However, this is highly related to the consumers' previous product-related experience, and, to some degree, to consumers' income-levels (***Chapters 9*** and ***12***). The results have suggested that, within the supermarket sample, expert consumers usually link *price* to a higher beef quality. On the other hand, novice consumers regard *price* as a necessary cost to obtain certain beef *qualities*. It should be pointed out that these results show that the effect of *price* is quite diminished with the presence of a strong brand name.

From these results, one can see that branding and quality grading (strongly related to certain superior quality aspects Portuguese consumers are interested in), delivered and communicated credibly in co-operation between cattle producers, slaughter industry, and the retailers, may possibly produce gratification for both beef suppliers and consumers in Portugal. Hence, the potential successful development or innovation of beef products in Portugal can be better assured by using new ideas based on inputs from the Portuguese consumer, and by consequently incorporating these ideas into product concepts, developing and testing product prototypes, and overall marketing mix. Nevertheless, in this research, it has been suggested that even though these optimistic voices are recognised in Portugal, a deficient behaviour in terms of management and organisation, as well as the incapability to satisfy major market requirements, might compromise the success of such strategies.

The presented *practical implications* show numerous pathways which beef marketeers can take for consumer-led product development in the Portuguese beef sector. However, caution is needed, as the studies showing various *beef quality models* were done with regard to beef steaks from *strip loin* muscle, targeting consumers with medium to higher income-levels (***Chapters 10***, ***11*** and ***12***). Thus, the results of these studies could be used for marketing of higher priced pieces of beef and considering Portuguese consumers with higher income levels.

13.3.1 Practical limitations

The main practical limitations come from the methodological and theoretical limitations of this work, thus they will not be repeated. Nevertheless, it should be mentioned that the guidelines of the present study on how to conceptualise and implement various results to product innovation and/or new product development, regarding *strip loin* beef steaks, were not applied nor tested, thus they could be a matter of the future research.

Figure 13.1: *Summary of the results from consumers' trials.*

These results are from ***Part IV*** of this thesis, where asterisk (*) confirms results from ***Part III*** and previous consumer studies on beef in Portugal (Marreiros, 2002; Marreiros & Ness, 2002).

[a]National branded beef; [b]National store branded beef; [c]Imported store branded beef. [↑]Expert consumers; [↓]Novice consumers.

Learn from yesterday, live for today, hope for tomorrow.
The important thing is not to stop questioning.

- Albert Einstein -

14
Future perspectives

The results presented in this research might be seen as a solid basis for a better understanding of the beef quality perception process regarding the Portuguese consumer, and future studies may use this research as a starting point when considering this phenomenon. However, even though a great deal of care was put into the design of the research, caution is needed when using and interpreting the obtained results, as the beef quality perception process is investigated in relation to a specific sample of Portuguese consumers and beef product.

This research raises a number of issues that deserve further research attention. Hence, only some of them are suggested bellow, as when observing even a small particle of consumer behaviour space, like quality perception, the complexity of various factors yield a never-ending (and rather interesting) universe of questions.

- In order to reinforce the presented findings, there is a need to conduct a study on consumers' beef quality perception process at a much larger scale including a wider sample of Portuguese consumers. It is expected that the consequent results will not significantly deviate from the results of this research, as they corroborate findings from other consumer studies.

- More in depth analysis should be conducted in order to identify the importance of various antecedents of brand in different beef product categories, but also with regard to different intrinsic and extrinsic cues. The same analysis should be undertaken for the cue origin. Thus, and with regard to beef marketing, relevant empirical guidelines may be drawn from such studies that would open a bulk of other pathways to follow in beef differentiation.

- The fact that Portuguese consumers use intrinsic cues, as colour and fat, in beef quality judgement, deserves more attention. More specifically, it would be of great interest to analyse more in depth what colour and degree of intramuscular fat Portuguese consumers actually prefer in beef. Even more interesting would be when one could compare these results with the experimental laboratory results. This could again open a new horizon

mainly for beef producers, who could use this information to adjust their cattle feeding programmes.

- Further, it would be rather interesting to pursue more in depth sensory beef quality aspects, namely tenderness. Portuguese consumers' preferred degree of tenderness should be set, and subsequently incorporated with laboratory experiments for deeper insights. This could give beef producers, as well as beef distributors in Portugal, space to operate and certainty of positive outcomes among consumers.

- Credence quality aspects of beef also need a more comprehensive study, especially because it was shown that Portuguese consumers differentiate beef on the quality aspect - safety. Here, the focus of the analysis should be on the stimulus/information that evoke certain safety quality meanings in consumers' minds.

- As the tasting of beef was conducted in controlled settings, and as the comparison with in-home tastings was not undertaken, it would be of great relevance to further pursue this.

- Finally, there is also the need to analyse the influence of purchase motives, like convenience, on Portuguese consumers' quality perception process, as this could bring forth more details for successful beef marketing campaigns. Despite the fact that this was done in this research, the sample used did not permit an in-depth analysis.

Even though there is a universe of questions out there that come to mind, we must sadly part here. Thus, let us end this discussion with a little ***Monty Python's sketch - Spectrum***[1]:

Presenter: Good evening. Tonight *Spectrum* looks at one of the major problems in the world today - that old vexed question of *what is going on.* Is there still time to confront it, let alone solve it, or is it too late? What are the figures, what are the facts, what do people mean when they talk about things? Alexander Hardacre of the Economic Affairs Bureau. *(Cut to equally intense pundit in front of a graph with three different coloured columns with percentages at the top. He talks with great authority.)*

Hardacre: In this graph, this column represents 23% of the population. This column represents 28% of the population, and this column represents 43% of the population. *(Cut back to presenter.)*

Presenter: Telling figures indeed, but what do they mean to you, what do they mean to me, what do they mean to the average man in the street? With me now is Professor Tiddles of Leeds University... *(Pull out to reveal bearded professor sitting next to presenter.)*

Presenter: ... Professor, you've spent many years researching into things, what do you think?

Professor: I think it's too early to tell. *(Cut to presenter, he talks even faster now.)*

Presenter: "Too early to tell" ... too early to say... it means the same thing. The word "say" is the same as the word "tell". They're not spelt the same, but they mean the same. It's an identical situation, we have with "ship" and "boat" *(holds up signs saying "ship" and "boat")* but not the same as we have with "bow" and "bough" *(holds up signs)* , they're spelt differently, mean different things but sound the same. (*he holds up signs saying "so there")* But the real question remains. What is the solution, if any, to this problem? What can we do? What am I saying? Why am I sitting in this chair? Why am I on this program? And what am I going to say next? Here to answer this is a professional cricketer. *(Cut to cricketer.)*

[1] `http://www.youtube.com/watch?v=gEzKqp9x9dM`

Cricketer: I can say nothing at this point. *(Cut back to presenter.)*

Presenter: Well, you were wrong... Professor? *(Pull out to reveal professor still next to him.)*

Professor: Hello. *(Cut to close-up of presenter.)*

Presenter: Hello. So... where do we stand? Where do we stand? Where do we sit? Where do we come? Where do we go? What do we do? What do we say? What do we eat? What do we drink? What do we think? What do we do?

Bibliography

Aaker, D.A., Kumar, V. & Day, G.S. (2004). *Marketing research*, 8^{th} edition. Wiley-John Wiley & Sons, Inc., USA.

Acebrón, L.B. & Dopico D.C. (2000). The importance of intrinsic and extrinsic cues to expected and experienced quality: An empirical application for beef. *Food Quality and Preference*, *11*, 229-238.

Aguiar Fontes, M., Banović, M., Lemos, J.P.C. & Barreira, M.M. (2009). Let's talk about attributes. Do they matter in beef differentiation? *Submitted for publication.*

Aguiar Fontes, M., Lemos, J.P.C., Banović, M., Monteiro, A.C.G., Lúcio, C., Duarte, F., Silva, M.F. & Barreira, M.M. (2008). Is beef differentiation a real source of competitiveness? A combination of procedures to achieve an answer. In R. Fanfani, E. Ball, L. Gutierrez & E. Ricci Maccarini (Eds.), *Competitiveness in agriculture and food industry: US and EU perspectives* - (BUP), Bologna, Italy.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior & Human Decision Processes*, *50 (2)*, 179-211.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*, 1^{st} edition. Englewood Cliffs, NJ: Prentice-Hall.

Alba, J.W. & Hutchinson, J.W. (1987). Dimensions of consumer expertise. *Journal of Consumer Research*, *13 (4)*, 411-454.

Andersen, E.S. (1994). The evolution of credence goods: A transaction approach to product specification and quality control. *Aarhus business school*, *MAPP working paper nº 21.*

Anderson, J.R. (1990). *Cognitive psychology and its implications*, 3^{rd} edition. New York: Freeman.

Anderson, R.E. (1973). Consumer dissatisfaction: The effect of disconfirmed expectancy on perceived product performance. *Journal of Marketing Research*, *10*, 38-44.

Angulo, A.M. & Gil J.M. (2007). Risk perception and consumer willingness to pay for certified beef in Spain. *Food Quality and Preference*, *18*, 1106-1117.

Antle, J.M. (1999). The new economics of agriculture. *American Journal of Agricultural Economics*, *81*, 993-1010.

Askegaard, S. & Madsen, T.K. (1995). European food cultures: An exploratory analysis of food related preferences and behaviour in European regions. *Aarhus business school*, *MAPP working paper nº 26.*

Aumaître, A. (1999). Quality and safety of animal products. *Livestock Production Science*, *59*, 113-124.

Bamberger, I. (1989). Developing competitive advantage in small and medium-size firms, long range planning. *Oxford*, *22 (5)*, 80-88.

Banović, M., Barreira, M.M. & Aguiar Fontes, M. (2006a). Portuguese household food expenditure: 1990, 1995 and 2000. *New Medit*, *2*, 25-31.

Banović, M., Barreira, M.M., Jorge R., Lemos, J.P.C., Silva, M.F. & Aguiar Fontes, M. (2004). Are EU consumers changing meat consumption habits? An analysis for the last decade. *Proceedings of the: IV Congresso Nacional de Economistas Agrícolas* (pp. 33-35), Faro, Portugal. Submitted for a chapter of the book - *Os desafios passados e as oportunidades futuras no sector agrícola e alimentar em Portugal*, to be edited by APDEA.

Banović, M., Barreira, M.M., Lopes A.C. & Aguiar Fontes, M. (2006b). Percepção do consumidor português relativamente à carne de bovino. Presented at the Seminar: *Carne de bovino de qualidade: Perspectiva do mercado*, Evóra, 21^{st} of Novembar.

Banović, M., Barreira, M.M., Silva, M.F. Lemos, J.P.C., Aguiar Fontes, M. & Jorge, R. (2008). The role of specific quality labels in rural development: Lessons from the Portuguese experience. In D. Tomić & M.M. Ševralić (Eds.), *Development of agriculture and rural areas in Central and Eastern Europe* (pp. 439-448). Mladost: Beograd, Serbia.

Banović, M., Grunert, K.G., Barreira, M.M. & Aguiar Fontes, M. (2009). Beef quality perception at the point of purchase: A study from Portugal. *Food Quality and Preference*, *20*, 335-342.

Banović, M., Grunert, K.G., Barreira, M.M. & Aguiar Fontes, M. (2010). Consumers' quality perception of national branded, national store branded, and imported store branded beef. *Meat Science*, *84*, 54-65.

Banović, M., Grunert, K.G., Scholderer, J., Barreira, M.M. & Aguiar Fontes, M. (2009). Impact of product related experience on cue utilization in product quality judgement at the point of purchase and upon product usage. *Submitted for publication.*

Barreira, M.M., Banović, M. & Aguiar Fontes, M. (2005). As preferências dos consumidores portugueses face ás crises. In D.O. Monteiro, A.S.G. Santos, E.N.D.G. Mena, R.B. Mestre & S.M.R. Sacoto (Eds.), *Proceedings of the XV Congresso de Zootecnia* (pp. 187-191), UTAD: Vila Real, Portugal.

Barreira, M.M., Brandão, Lemos, J.P.C., & Aguiar Fontes, M. (2009). Quality perceptions of PDO beef producers, *Agricultural Economics Review*, in press.

Barreira, M.M. & Duarte, M.F. (1997). An analysis of changes in Portuguese Meat Consumption. In B. Wierenga, A. van Tilburg, K.G. Grunert, J.B.E.M. Steenkamp & M. Wedel (Eds.), *Agricultural marketing and consumer behaviour in a changing world* (pp. 261-273). Norwell, MA: Kluwer Academic Publishers.

Barreira, M.M. & Vicente, S. (2001). Os efeitos da *BSE* na procura de carne em Portugal. In M.M. Barreira & R. Jorge (Eds.), *Agricultura, economia e sociedade: Ensaios de homenagem ao Prof. Fernando Estácio* (pp. 131-152). IFADAP, Lisboa, Portugal.

Bech, A., Grunert, K.G., Bredahl, L., Juhl, H.J. & Poulsen, C.S. (2001). Consumers' quality perception. In L.J. Frewer, E. Risvik, & H. Schifferstein (Eds.), *Food, people and society: A European perspective of consumers' food choices* (pp. 97-113). Springer.

Becker, T. (2000). Consumer perception of fresh meat quality: A framework for analysis. *British Food Journal*, *102 (3)*, 158-176.

Becker, T., Benner, E. & Glitsch, K. (2000). Consumer perception of fresh meat quality in Germany. *British Food Journal*, *102(3)*, 246-266.

Bellizzi, J. A., Kruckeberg, H. F., Hamilton, J. R., & Martin, W. S. (1981). Consumer perceptions of national, private, and generic brands. *Journal of Retailing*, *57*, 56-70.

Bernués, A., Olaizola, A. & Corcoran, K. (2003a). Extrinsic attributes of red meat as indicators of quality in Europe: An application for market segmentation. *Food Quality and Preference*, *14*, 265-276.

Bernués, A., Olaizola, A. & Corcoran, K. (2003b). Labelling information demanded by European consumers and relationships with purchasing motives, quality and safety of meat. *Meat Science*, *65*, 1095-1106.

Bettman, J.R. & Park, C.W. (1980). Effects of prior knowledge and experience and phase of the choice process on consumer decision processes: A protocol analysis author. *Journal of Consumer Research*, *7 (3)*, 234-248.

Birn, R., Hague, P. & Vangelder, P. (1990). *A handbook of marked research techniques.* Kogan Page.

Bredahl, L. (2003). Cue utilisation and quality perception with regard to branded beef. *Food Quality and Preference*, *15*, 65-75.

Bredahl, L., Grunert, K. G. & Fertin, C. (1998). Relating consumer perceptions of pork quality to physical product characteristics. *Food Quality and Preference*, *9*, 273-281.

Blisard, N., Biing-Hwan, L., Cromatie, J. & Ballenger, N. (2002). America's changing appetite: Food consumption and spending to 2020. *Food Review*, *25 (1)*, 2-9.

Bremner, H.A. (2000). Toward practical definitions of quality for food science. *Critical Reviews in Food Science and Nutrition*, *40*, 83-90.

Broh, R.A. (1982). *Managing quality for higher profits.* McGraw-Hill, New York.

Brucks, M. (1985). The effects of product class knowledge on information search behavior. *Journal of Consumer Research*, *12 (1)*, 1-16.

Brunsø, K., Fjord, T.A. & Grunert, K.G. (2002). Consumers' food choice and quality perception. *MAPP working paper nº 77.* Aarhus: Aarhus School of Business.

Brunsø, K., Bredahl, L., Grunert, K.G. and Scholderer, J. (2005). Consumer perception of the quality of beef resulting from various fattening regimes. *Livestock Production Science*, *94*, 83-93.

Brunsø, K., Scholderer, J. & Grunert, K. G. (2004a). Closing the gap between values and behavior. A means-end theory of lifestyle. *Journal of Business Research*, *57*, 665-670.

Brunsø, K., Scholderer, J., & Grunert, K. G. (2004b). Testing relationships between values and food-related lifestyle: Results from two European countries. *Appetite*, *43*, 195-205.

Burton, M., Young, T. & Cromb, R. (1999). Meat consumers' long-term response to perceived risks associated with *BSE* in Great Britain. *Cahiers d'Economie et Sociologie Rurales*, *50*, 7-19.

Byrne, B.M. (1998). *Structural equation modeling with Lisrel, Prelis, and Simplis: Basic concepts, applications, and programming.* Mahwah, NJ: Lawrence Erlbaum Associates.

Byrne, P.J., Capps Jr., O. & Saha, A. (1998). Analysis of quick-serve, mid-scale, and up-scale food away from home expenditures. *International Food and Agribusiness Management Review*, *1 (1)*, 51-72.

Cardello, A.V. (1995). Food quality: Relativity, context and consumer expectations. *Food Quality and Preference*, *6*, 163-170.

Cardello, A.V. (1997). Food stereotypes: Prejudice in the pantry. *Cereal Foods World*, *42 (4)*, 231-233.

Cardoso, L. (2003). *Gestão estratégica das organizações: Como vencer nos negócios do século XXI*, 6^{th} edition. Lisboa, Editorial Verbo.

Carolino, N., Gama, T.L., Silva, B.L. & Espadinha, P. (2006). Parâmetros genéticos de características da carcaça em bovinos da raça Alentejana. *43 Reunião Anual da Sociedade Brasileira de Zootecnia.*

Carolino, N. (2006). Estratégias de selecção na raça bovina Alentejana. *Tese de Doutoramento*, Faculdade de Medicina Veterinária da Universidade Técnica de Lisboa, Portugal.

Caswell, J.A., Bredahl, M.E. & Hooker, N.H. (1998). How quality management metasystems are affecting the food industry. *Review of Agricultural Economics*, *20 (2)*, 547-557.

CDC - Department of health and human services / centres for disease control and prevention, (2004). *Bovine Spongiform Encephalopathy* (*BSE*) and *Creutzfeldt-Jakob disease* (*CJD*). [Accessed at: `http://www.cdc.gov/ncidod/diseases/cjd/cjd.htm`]

Chambaz, A., Scheeder, M. R. L., Kreuzer, M., & Dufey, P. A. (2003). Meat quality of *Angus*, *Simmental*, *Charolais* and *Limousin* steers compared at the same intramuscular fat content. *Meat Science*, *63*, 491-500.

Chernov, A. & Carpenter, G.S. (2001). The role of market efficiency intuitions in consumer choice: A case of compensatory inferences. *Journal of Marketing Research*, *38*, 349-361.

Chin, W.W. (2000). Multiple-group analysis with *PLS*: Frequently asked questions, *Partial least squares & PLS-graph.* [Available at: `http://discnt.cba.uh.edu/chin/plsfaq/plsfaq.htm`]

Chin, W.W. (1998). The partial least squares approach to structural equation modelling. In G.A. Marcoulides (Ed.), *Modern methods for business research* (pp.295-358). Mahwah: Lawrence Erlbaum Associates.

Corcoran, K., Bernués, A., Manrique, E., Pacchioli, M.T., Baines, R. & Boutonnet, J.P. (1999). A systems approach to quality assurance: Consumer attitudes towards red meat. Seminar on *Production systems and product quality*, FAO-CIHEAM, Network on sheep and goats-subnetwork on production systems, Murcia, Spain, 23-25 September.

Cox, D. F. (1967a). Risk handling in consumer behaviour- an intensive study of two cases. In D.F. Cox (Ed.), *Risk taking and information handling in consumer behavior* (pp. 34-82). Boston: Graduate School of Business Administration, Harvard University.

Cox, D. F. (1967b). The sorting rule model of the consumer product evaluation process. In D.F. Cox (Ed.), *Risk taking and information handling in consumer behavior* (pp. 324-370). Boston: Graduate School of Business Administration, Harvard University.

Crosby, P.B. (1979). *Quality is free: The art of making quality certain.* New York: McGraw-Hill.

Crowley, C.S.L. & Shimazaki, Y. (2005). Impact of *BSE* announcement on U.S. retail beef sales: A time-series analysis. *Journal of Agribusiness*, `23 (1)`, 19-40.

Cunningham, I.C.M., Hardy, A. P., & Imperia, G. (1982). Generic brands versus national brands and store brands. *Journal of Advertising Research*, *22*, 25-32.

Dagevos, J.C. & van Gaasbeek, T. (2000). Approaching contemporary food consumers: A few reflections on research and results. Proceedings of the 71st EAAE Seminar on *The Food Consumer in the Early 21st Century*, Zaragoza, Spain.

Darby, M.R. & Karni, E. (1973). Free competition and the optimal amount of fraud. *Journal of Law and Economics*, *16*, 67-88.

Davidson, A., Schroder, M.J.A. & Bower, J.A. (2003). The importance of origin as a quality attribute for beef results from a Scottish consumer survey. *International Journal of Consumer Studies*, *27 (2)*, 91-98.

Davies, S. (2001). Food choice in Europe: The consumer perspective. In L.J. Frewer, E. Risvik, & H. Schifferstein (Eds.), *Food, people and society: A European perspective of consumers' food choices* (pp. 365-380). Springer.

Dawar, N. & Parker, P. (1994). Marketing universals: Consumers' use of brand name, price, psychical appearance, and retailer reputation as signals of product quality. *Journal of Marketing*, *58*, 81-95.

Deaton, A.S. & Muellbauer, J. (1980). An almost ideal demand system. *American Economic Review*, *70*, 312-326.

DEFRA-Department for Environment Food and Rural Affairs (2004). *Bovine Spongiform Encephalopathy* (*BSE*). [Accessed at: `http://www.defra.gov.uk/animalh/bse/index.html`]

de Jonge, J., van Trijp, H., Goddard, H. & Frewer, L. (2008). Consumer confidence in the safety of food in Canada and the Netherlands: The validation of a generic framework. *Food Quality and Preference*, *19*, 439-451.

Dick, A., Chakravarti, D., & Biehal, G. (1990). Memory influences on inferential processing during consumer choice. *Journal of Consumer Research*, *17 (1)*, 82-93.

Dodds, W. B., Monroe, K. B. & Grewal, D. (1991). Effects of price, brand and store information on buyers' product evaluations. *Journal of Marketing Research*, *28*, 307-319.

Dong, D., Kaiser, H.M. & Myrland, Ø. (2007). Quantity and quality effects of advertising: A demand system approach. *Agricultural Economics*, *36 (3)*, 313-324.

Dranseld, E., Martin, J.F., Fisher, A., Nute, G.R., Zygyiannis, D., Stamataris, C., Thorkelsson, G., Valdimarsdóttir, T., Piasentier, E., Mills, C., Sañudo, C. & Alfonso, M. (2000). Home placement testing of lamb conducted in six countries. *Journal of Sensory Studies*, *15 (4)*, 421-436.

Engel, J.F, Blackwell, R.D. & Miniard, P.W. (1995). *Consumer behaviour*, 8^{th} edition. The Dryden Press, Forth Worth.

EC - European Commission (2004a). Report on the monitoring and testing of ruminants for the presence of *Transmissible Spongiform Encephalopathy* (*TSE*) in the EU in 2003, including the results of the survey of prion protein genotypes in sheep breeds. [Accessed at: `http://europa.eu.int/comm/food/food/biosafety/bse/annual_reps_en.htm`]

EC - European Commission (2004b). Protection of geographical indications, designations of origin and certificates of specific character for agricultural products and foodstuffs. *Working document of the commission services, guide to community regulations, 2nd edition*, Brussels.

Erdem, T. & Swait, J. (1998). Brand equity as a signaling phenomenon. *Journal of Consumer Psychology*, *7*, 131-158.

EUROSTAT (2004a). Agricultural statistics.

EUROSTAT (2004b). Fisheries.

EUROSTAT (2008). *Per capita* meat consumption in the EU. [Accessed at: `http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=apro_mt_bal&lang=en`]

Fearne, A. & Bates, S. (2000). Co-operative milk marketing: Report to the milk development council. *Agricultural Economics and Business Management*, Imperial College at Wye University of London.

Fishbein, M. & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Addison-Wesley Publishing Company, London.

Ford, G.T., Smith, D.B. & Swasy, J.L. (1990). Consumer skepticism of advertising claims: Testing hypotheses from economics of information, *Journal of Consumer Research*, *16*, 433-441.

Fornell, C. & Cha, J. (1994). Partial Least Squares. In R.P. Bagozzi (Ed), *Advanced methods of marketing research* (pp. 52-78). Blackwell, Cambridge.

Fraústo da Silva, M. (1996). Crescimento, características da carcaça e qualidade da carne de raças bovinas nacionais. Universidade Técnica de Lisboa, Faculdade de Medicina Veterinária, *PhD thesis*.

Frewer, L.J., Risvik, E. & Schifferstein, H. (2001). Food, people and society: A European perspective of consumers' food choices. Springer.

Geay,Y., Bauchart, D., Hocquette, J.F. & Culioli, J. (2002). Valeur diététique et qualités sensorielles des viandes de ruminants. Incidence de l'alimentation des animaux. *INRA Prod. Anim.*, *15(1)*.

Glitsch, K. (2000). Consumer perception of fresh meat quality: Cross-national comparison. *British Food Journal*, *102 (3)*, 177-194.

GPPAA (2000). Anuário Pecuário (2000). *Gabinete de Planeamento e Política Agro-Alimentar*, Portugal.

GPPAA (2001). Anuário Pecuário (2001). *Gabinete de Planeamento e Política Agro-Alimentar*, Portugal.

GPPAA (2002). Anuário Pecuário (2002). *Gabinete de Planeamento e Política Agro-Alimentar*, Portugal.

Gracia, A. & Albisu L.M. (2001). Food consumption in the European Union: Main determinants and country differences. *Agribusiness*, *17 (4)*, 469-488.

Grunert, K.G. (2002). Current issues in the understanding of consumer food choice. *Trends in Food Science & Technology*, *13 (8)*, 275-285.

Grunert, K.G. (1995). Food quality: A means-end perspective. *Food Quality and Preference*, *6 (3)*, 171-176.

Grunert, K.G. (2005). Food quality and safety: Consumer perception and demand. *European Review of Agricultural Economics*, *32 (3)*, 369-391.

Grunert, K.G. (2006). Future trends and consumer lifestyles with regard to meat consumption. *Meat Science*, *74*, 149-160.

Grunert, K.G. (2003). How changes in consumer behaviour and retailing affect competence requirements for food producers and processors. Proceedings of the *ERS/USDA* workshop: *Global Markets for High Value Food*, Washington, DC.

Grunert, K.G. (1997). What's in a steak? A cross-cultural study of the quality perception of beef. *Food Quality and Preference*, *8*, 157-174.

Grunert, K.G., Bredahl, L. & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector: A review. *Meat Science*, *66*, 259-272.

Grunert, K. G., Hartvig Larsen, H., Madsen, T. K. & Baadsgaard, A. (1996). *Market orientation in food and agriculture*. Norwell, MA: Kluwer.

Grunert, K. G., Skytte, H., Esbjerg, L., Poulsen, C. S., & Hviid, M. (2002). Dokumenteret kødkvalitet. *Aarhus School of Business*, *MAPP project, paper nº 2-02*.

Guerrero L., Colomer Y., Guàrdia M.D., Xicola J., & Clotet, R. (2000). Consumer attitude towards store brands. *Food Quality and Preference*, *11 (5)*, 387-395.

Gutman, J. (1982). A means-end chain model based on consumer categorization processes. *Journal of Marketing*, *46(2)*, 60-72.

Gutman, J. (1991). Exploring the nature of linkages between consequences and values. *Journal of Business Research*, *22*, 143-149.

Hair J.F., Jr., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2006). *Multivariate data analysis*. New Jersey: Pearson, Prentice Hall.

Hansen, T. (2001). Quality in the market place: A theoretical and empirical investigation. *European Management Journal*, *19 (2)*, 203-211.

Harris, M.J. & Blisard, N. (2002). Food spending and the elderly. *Food Review*, *25 (2)*, 14-18.

Harrison, G.W. & List, J.A. (2004). Field experiments. *Journal of Economic Literature*, *42 (4)*, 1009-1055.

Hauser, J.R. & Clausing, D. (1988). The house of quality. *Harvard Business Review*, *66 (3)*, 63-73.

Hayes-Roth, B. (1977). Evolution of cognitive structures and processes. *Psychological Review*, *84 (3)*, 260-278.

Heilig, G.K. (1993). Food, lifestyles and energy. In van der Heij, M.R.H., Lowik & Th. Ockhuizen (Eds.), *Food nutrition and policy in Europe* (pp. 61-87), Pudoc Scientific Publishers, Wageningen.

Henson, S.J. & Northern, J.R. (2000). Consumer assessment of the safety of beef at the point of purchase: A pan-European study. *Journal of Agricultural Economics*, *51 (1)*, 90-105.

Hesterberg, T., Monaghan S., Moore, D.S., Clipson, A., & Epstein, R. (2003). *Bootstrap methods and permutation tests*. W. H. Freeman and Company, New York.

Holbrook, M.B. & Hirschman, E.C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research*, *9 (2)*, 132-140.

IDRHa (2004). Evolução dos produtos tradicionais com nomes protegidos: 1997 a 2001. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

IDRHa (2007a). Nomes qualificados ao abrigo do Regulamento CEE nº 2081/92, modificado. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

IDRHa (2004b). Produtos tradicionais com nomes protegidos. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

IDRHa (2005). Produtos tradicionais com nomes protegidos. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

IDRHa (2006). Produtos tradicionais com nomes protegidos. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

IDRHa (2007b). Produtos tradicionais com nomes protegidos. *Instituto de Desenvolvimento Rural e Hidráulica*, Portugal.

INE (2008). Estatísticas agrícolas. *Instituto Nacional de Estatística*, Portugal.

INE (2007). Annual producer price. *Instituto Nacional de Estatística*, Portugal.

INE (1999). Balança alimentar portuguesa 1990-1997. Série Estudos n^{o}79, Portugal.

INE (1996). Censos 1991, Resenseamento geral da população e da habitação, resultados definitivos. *Instituto Nacional de Estatística*, Portugal.

INE (2002a). Censos 2001, Resenseamento geral da população e da habitação, resultados definitivos. *Instituto Nacional de Estatística*, Portugal.

INE (2004a). Estatísticas agrícolas, Portugal.

INE (2004b). Estatísticas do comércio internacional, Portugal.

INE (2004c). Estatísticas do emprego. *Instituto Nacional de Estatística*, Portugal.

INE (1992a). Estimativas de População residente por NUTS, Distritos e Conselhos, 1990 e 1991. *Instituto Nacional de Estatística*, Portugal.

INE (2003). Estimativas de População residente intercentsitárias, 1991-2000, Portugal, NUTS II, NUTS III e Municípios. *Instituto Nacional de Estatística*, Portugal.

INE (1992b). Inquérito aos orçamentos familiares 1989/90. *Instituto Nacional de Estatística*, Portugal.

INE (1997). Inquérito aos orçamentos familiares 1994/95. *Instituto Nacional de Estatística*, Portugal.

INE (2002b). Inquérito aos orçamentos familiares 2000. *Instituto Nacional de Estatística*, Portugal.

Issanchou, S. (1996). Consumer expectations and perceptions of meat and meat product quality. *Meat Science*, *43*, 5-19.

Jensen, H. & Yen, S. (1996). Food expenditures away from home by type of meal. *Canadian Journal of Agricultural Economics*, *44*, 67-80.

Jensen, R. (1999). *The dream society: How the coming shift from information to imagination will transform your business*. London: McGraw-Hill.

Jin, H.J. & Koo, W.W. (2003). The effect of the *BSE* outbreak in Japan on consumers' preferences. *European Review of Agricultural Economics*, *30 (2)*, 173-192.

Johansson, J. K. (1989). Determinants and effects of the use of *made in* labels. *International Marketing Review*, *6*, 47-58.

Johnson, E. J. & Russo J.E. (1981). Product familiarity and learning new information. In Kent B. Monroe & Ann Arbor (Eds.), *Advances in Consumer Research*, *vol. 8*, MI: Association for Consumer Research.

Johnson, E.J. & Russo J.E. (1984). Product familiarity and learning new information. *Journal of Consumer Research*, *11 (1)*, 542-550.

Joiner, C. & Loken, B. (1998). The inclusion effect and category-based induction: Theory and application to brand categories. *Journal of Consumer Psychology*, *7*, 101-29.

Jöreskog, K. & Sörbom, D. (1993). LISREL 8: *Structural equation modeling with the SIMPLIS command language*. Hillsdale, NY: Lawrence Erlbaum.

Jöreskog, K. (1993). Testing structural equation models. In K.A. Bollen & J.S. Long (Eds.), *Testing structural equation models* (pp.294-316). Newbury Park, CA: Sage.

Juhl, H.J., Esbjerg, L., Grunert, K.G., Bech-Larsen, T., & Brunsø, K. (2006). The fight between store brands and national brands - What's the score? *Journal of Retailing and Consumer Services*, *13 (5)*, 331-338.

Juran, J. M. (1989). *Juran on leadership for quality*. The Free Press, Collier-Macmillan, New York.

Kardes, F.R., Posavac, S.S. & Cronley, M.L. (2004). Consumer inference: A review of processes, bases, and judgment contexts. *Journal of Consumer Psychology*, *14 (3)*, 230-256.

Kinsey, J. (1993). GATT and the economics of food safety. *Food Policy*, *18 (2)*, 163-176.

Kohli, A.K. & Jaworski, B.J. (1990). Market orientation: The construct, research propositions, and menagerial implications. *Journal of Product Innovation Management*, *8*, 240-251.

Krystallis, A. & Arvanitoyannis, I.S. (2006). Investigating the concept of meat quality from the consumers' perspective: The case of Greece. *Meat Science*, *72*, 164-176.

Lappalainen, R., Kearney, J. & Gibney, M. (1998). A pan EU survey of consumer attitudes to food, nutrition and health: An overview. *Food Quality and Preference*, *9 (6)*, 467-478.

Latvala, T. & Kola, J. (2002). Demand for and value of credence characteristics: Case beef. *Proceedings of the X European Association of Agricultural Economists Congress: Exploring diversity in the European agri-food system*. Zaragoza, Spain.

Lawless, H. (1995). Dimensions of sensory quality: A critique. *Food Quality and Preference*, *6 (3)*, 191-199.

Leffler, K. B. (1982). Ambiguous changes in product quality. *American Economic Review*, *72 (5)*, 956-967.

List, J.A. (2009). An introduction to eld experiments in economics. *Journal of Economic Behavior & Organization*, *70*, 439-442.

Loureiro, M.L. & McCluskey, J.J. (2000). Assessing consumer response to protected geographical identification labeling. *Agribusiness*, *16 (3)*, 309-320.

Loureiro, M.L., & Umberger, W.J. (2007). A choice experiment model for beef: What US consumer responses tell us about relative preferences for food safety, country-of-origin labelling and traceability. *Food Policy*, *32(4)*, 496-514.

Malhotra, N.K. (2007). *Marketing research: An applied orientation*, 5^{th} edition. Pearson:Prentice Hall, New Jersey.

Mangen, M. J.; Burrell, A. M. (2001). Decomposing preferences shifts for meat and fish in the Netherlands. *Journal of Agricultural Economics*, *52 (2)*, 16-28.

Manrique, J. & Jensen, H.H., 1998. Working women and expenditures on food away-from-home and at-home in Spain. *Journal of Agricultural Economics*, *49 (3)*, 321-333.

Marks, L.J. & Olson, J.C. (1981). Toward a cognitive structure conceptualization of product familiarity. In Kent B. Monroe & Ann Arbor (Eds.), *Advances in Consumer Research*, *vol. 8* (pp. 145-150), MI: Association for Consumer Research.

Masson, K. & Bequette, J. (1998). Product experience and consumer product attribute accuracy. *Journal of Consumer Marketing*, *15 (4)*, 343-357.

Marreiros, C.G. & Ness, M. (2002). Attitudes to food and beef: The Portuguese consumer. *Proceedings of the Academic of Marketing Annual Conference, The Marketing landscape: Symposium for the future*, Nottingham.

Marreiros, C.G. & Ness, M. (2002). Perceptions of *PDO* beef: The Portuguese consumer. *Proceedings of the International Congress of the EAAE*, Zaragoza, Spain.

Martínez, P.A.M. (2006). Food safety statistics. *Proceedings* of the 30^{th} CEIES Seminar: *Consumer Protection Statistics*, Ljubljana, 1 - 2 June, 2006.

McIntyre, S.H. & Bender, S.D.F.G. (1986). Purchase-intercept technique (PIT) in comparison to telephone and mail surveys. *Journal of Retailing*, *62 (4)*, 364-383.

Melton, S.L. (1990). Effects of feeds on flavour of red meat: A review. *Journal of Animal Science*, *68*, 4421-4435.

Menkaus, D.J., Colin, D.P.M., Whipple, G.D. & Field, R.A. (1993). The effects of perceived product attributes on the perception of beef. *Agribusiness*, *9 (1)*, 57-63.

Meredith, W. (1993). Measurement invariance, factor analysis, and factorial invariance. *Psychometrika*, *58*, 525-543.

Meulenberg, M.T.G. (1997), Evolution of marketing institutions: A channel approach. In B. Wierenga, A. van Tilburg, K.G. Grunert, J.B.E.M. Steenkamp & M. Wedel (Eds.), *Agricultural marketing and consumer behaviour in a changing world* (pp.). Norwell, MA: Kluwer Academic Publishers.

Meulenberg, M.T.G. & Viaene, J. (1998). Changing food marketing systems in Western countries. In W.M.F. Jongen & M.T.G. Meulenberg (Eds.), *Innovation of food production systems: Product quality and consumer acceptance* (pp. 5-36). Wageningen: Wageningen Pers.

Meyers-Levy, J. & Tybout, A.M. (1989). Schema congruity as a basis for product evaluation. *Journal of Consumer Research*, *16*, 39-54.

Mihalopoulos, V.G. & Demoussis, M.P. (2001). Greek household consumption of food away from home: A microeconometric approach. *European Review of Agricultural Economics,28 (4)*, 421-432.

Monroe, K.B. & Krishnan, R. (1985). The effect of price on subjective product evaluations. In J. Jacoby, & J. C. Olson (Eds.), *Perceived quality: How consumers view stores and merchandise* (pp. 209-232). Toronto: Lexington.

Nayga Jr., R.M. (1995). Determinants of U.S. household expenditures on fruit and vegetables: A note and update. *Journal of Agricultural and Applied Economics*, *27 (2)*, 588-594.

Nayga Jr., R.M. (1996). Wife's labor force participation and family expenditures for prepared food, food prepared at home and food away from home. *Agricultural and Resource Economics Review*, *25 (2)*, 179-186.

Nayga Jr., R.M. & Capps Jr., O. (1995). Factors affecting the probability of consuming fish and shellfish in the away from home and at home markets. *Journal of Agricultural and Applied Economics*, *27 (1)*, 161-171.

Nelson, P. (1974). Advertising as information. *Journal of Political Economy*, *82*, 729-754.

Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, *78*, 311-329.

Northen, J.R., 2000, Quality attributes and quality cues: Effective communication in the UK meat supply chain. *British Food Journal*, *102 (3)*, 230-245.

Notani, S.A. (1998). Moderators of perceived behavioral control's predictiveness in the Theory of Planned Behavior: A meta-analysis. *Journal of Consumer Psychology,7 (3)*, 247-271.

Nute, G. R. (1999). Sensory assessment of poultry meat quality. In R.I. Richardson & G.C. Mead (Eds.), *Poultry meat science*. CAB International.

OECD (1999). Qualité et sécurité alimentaires: Les dimensions commerciales, Paris, France.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*, 460-469.

Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, *20*, 418-431.

Oliver, M.A., Nute, G.R., Font i Furnols, M., San Julián R., Campo, M.M., Sañudo, C., Cañeque, V., Guerrero, L., Alvarez, I., Díaz, M.T., Branscheid, W., Wicke, M., & Montossi, F. (2006). Eating quality of beef, from different production systems, assessed by German, Spanish and British consumers. *Meat Science*, *74*, 435-442.

Oude Ophuis, P.A.M. & van Trijp, H.C.M. (1995). Perceived quality: A market driven and consumer oriented approach. *Food Quality and Preference*, *6 (3)*, 177-183.

Olson, J.C. (1978). Inferential belief formation in the cue utilization process. *Advances in Consumer Research*, *5*, 706-713.

Olson, J.C. (1977). Price as an informational cue: Effects on product evaluations. In A. G. Woodside, J. N. Sheth, & P. D. Bennett (Eds.), *Consumer and industrial buying behavior* (pp. 267-286). New York: Elsevier.

Olson, J.C. & Dover, P.A. (1978). Attitude maturation: Changes in underlying belief structures over time. In H. Keith Hunt (Ed.), *Advances in Consumer Research*, *Vol. 5*, MI: Association for Consumer Research.

Olson, J.C. & Jacoby, J. (1972). Cue utilization in the quality perception process. *Proceedings of the 3rd Annual Conference of the Association for Consumer Research* (pp. 167-179). Chicago.

Olson, J. C. & Reynolds, T. J. (1983). Understanding consumers' cognitive structures: Implications for marketing strategy. In L. Percy & A. G. Woodside (Eds.), *Advertising and consumer psychology* (pp. 77-90). Lexington, MA: Lexington Books.

Osherson, D., Smith, E. E., Wilkie, O.,Lopez, A. & Shafir, E. (1990). Category-based induction. *Psychological Review*, *97*, 185-200.

Peracchio, L.A. & Tybout, A.M. (1996). The moderating role of prior knowledge in schema-based product evaluation. *Journal of Consumer Research*, *23 (3)*, 177-192.

Park C.W., & Lessig, V.P. (1981). Familiarity and its impact on consumer decision biases and heuristics. *Journal of Consumer Research*, *8 (2)*, 223-231.

Peri, C. (2005). Universe of food quality. *Food Quality and Preference*, *17*, 3-8.

Peter, J.P., Olson, J.C. & Grunert, K.G. (1999). *Consumer behaviour and marketing strategy.* European Edition, Maidenhead: McGraw-Hill.

Pirsig, R.M. (2007). Zen and the art of motorcycle maintenance: An inquiry into values. 25^{th} anniversary edition. Vintage Books, UK.

Project AGRO 422 (2004-2008). A quality policy for the beef sector in Portugal: Production systems, consumers' tastes and preferences. Acção 8.1. da Medida 8 do programa operacional *Agricultura e Desenvolvimento Rural*, Portugal.

Punj, G.N. & Staelin, R. (1983). A model of consumer information search behavior for new automobiles. *Journal of Consumer Research*, *9 (4)*, 366-380.

Raju, P.S., Lonial, S.C. & Magold, W.G. (1995). Differential effects of subjective knowledge, objective knowledge, and usage experience on decision making: An exploratory investigation. *Journal of Consumer Psychology*, *4 (2)*, 153-180.

Raju, P.S. & Reilly, M.D. (1980). Product familiarity and information processing strategies: An exploratory investigation. *Journal of Business Research*, *8*, 187-212.

Rao, A.R. & Monroe, K.B. (1988). The moderating effect of prior knowledge on cue utilization in product evaluations. *Journal of Consumer Research*, *15 (2)*, 253-264.

Ray, D. & Hughes, D. (1994). Forces driving partnerships and alliances in the European Food Industry. In D. Hughes (Ed.), *Breaking with tradition: Building partnerships and alliances in the European food industry* (pp. 10-32), Wye College Press, UK.

Realini, C. E., Duckett, S. K., Brito, G. W., Dalla Rizza, M., & De Mattos, D. (2004). Effect of pasture vs. concentrate feeding with or without antioxidants on carcass characteristics, fatty acid composition, and quality of Uruguayan beef. *Meat Science*, *66*, 567-577.

Resurreccion, A.V.A. (2003). Sensory aspects of consumer choices for meat and meat products. *Meat Science*, *66*, 11-20.

Richardson, P.S., Dick, A.S., & Jain, A.K. (1994). Extrinsic and intrinsic cue effect on perceptions of store brand quality. *Journal of Marketing*, *58 (4)*, 28-36.

Ringle, C., Wende S., & Will, A. (2005). Smart-PLS version 2.0. [Available at `http://www.smartpls.de`]

Ritson, C. (1988). *Agricultural economics: Principles and policy.* BSP Professional Books, Oxford, Great Britain.

Ritson, C. (2004). Personal communication.

Ritson, C. & Hutchins, R. (1995). Supply and food availability. In D.W. Marshall (Ed.), *Food choice and the consumer.* Blackie, London.

Ritson, C. & Kuznesof, S. (1996). The marketing of rural food products and its role in sustaining the rural economy. In P. Allanson and M. Whitby (Eds.), *The rural economy and the British countryside.* London, Earthscan.

Ritson, C. & Petrovici, D. (2001). The economics of food choice: Is price important? In L.J. Frewer, E. Risvik, & H. Schifferstein (Eds.), *Food, people and society: A European perspective of consumers' food choices* (pp.339-361). Springer.

Roininen, K., Arvola, A. & Lähteenmäki, L. (2006). Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association. *Food Quality and Preference*, *17*, 20-30.

Roosen, J., Lusk, J.L. & Fox, J.A. (2003). Consumer demand for and attitudes toward alternative beef labeling strategies in France, Germany, and the UK. *Agribusiness,19 (1)*, 77-90.

Sabates, R., Gould, B.W. & Villarreal, H.J. (2001). Household composition and food expenditures: A cross-country comparison. *Food Policy*, *26*, 571-586.

Santos, C., Nicolau, J. & Aguiar, M. (2000). A procura nacional de carne. Modelo AIDS e cointegrao. Proceedings of the 3^{rd} - Congresso Nacional de Economistas Agrícolas - APDEA, *A agricultura portuguesa numa economia globalizada* (pp. 615-664).

Sanjuán, A.I. & Dawson, P.J. (2003). Price transmission, *BSE* and structural breaks in the UK meat sector. *European Review of Agricultural Economics*, *30(2)*, 155-172.

Savell, J.W., Cross, H.R., Francis, J. J., Wise, J.W., Hale, D.S., Wilkes, D.L., & Smith, G.C. (1989). National consumer retail beef study: Interaction of trim level, price and grade on consumer acceptance of beef steaks and roasts. *Journal of Food Quality*, *12*, 251-274.

Selnes, F. & Troye, S.V. (1989). Buying expertise, information search, and problem solving. *Journal of Economic Psychology*, *10*, 411-428.

Senauer, B., Asp, E. & Kinsey, J. (1991). Food trends and the changing consumer, Eagan Press, St. Paul.

Scholderer, J., Nielsen, N. A., Bredahl, L., Claudi-Magnussen, C. & Lindahl, G. (2004). Organic pork: Consumer quality perceptions - Final report, *MAPP project paper nº 02-04*. Arhus: Aarhus School of Business.

Sheppard, B.H., Hartwick, J. & Warshaw, P.R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, *15*, 325-343.

Shewhart, W.A. (1931). Economic control of quality of manufactured product. New York, D. Van Nostrand Company.

Smith, D.B. (1990). The economics of information: an empirical approach to Nelson's search-experience framework. *Journal of Public Policy and Marketing*, *9*, 111-28.

Solomon, M., Bamossy, G. & Askegaard, S. (2002). *Consumer behaviour: A European perspective*. Prentice-Hall Europe.

Steenkamp, J.B.E.M. (1990). A conceptual model of the quality perception process. *Journal of Business Research*, *21*, 309-333.

Steenkamp, J.B.E.M. (1989). *Product quality: An investigation into the concept and how it is perceived by consumers*. Assen: Van Gorcum.

Steenkamp, J.B.E.M. (1997). Dynamics in consumer behavior with respect to agricultural and food products. In B. Wierenga, A. van Tilburg, K.G. Grunert, J.B.E.M. Steenkamp & M. Wedel (Eds.), *Agricultural marketing and consumer behaviour in a changing world* (pp. 143-188). Norwell, MA: Kluwer Academic Publishers.

Steenkamp, J.B.E.M. & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research*, *25 (1)*, 78-90.

Steenkamp, J.B.E.M. & van Trijp, H.C.M. (1996). Quality guidance: A consumer-based approach to food quality improvement using partial least squares. *European Review of Agricultural Economics*, *23*, 195-215.

Steiger, J.H. & Lind, J.C. (1980). Statistically based tests for the number of common factor. Paper presented at the Psychometric Annual Meeting, Iowa City, IA.

Stewart, H. & Yen, S.T. (2004). Changing household characteristics and the away-from-home food market: A censored equation system approach. *Food Policy*, *29*, 643-658.

Stigler, G.J. (1961). The economics of information. *Journal of Political Economy, 69 (3)*, 213-225.

Stokes, R.C. (1985). The effect of price, package, design and brand familiarity on perceived quality. In J. Jacoby & J. Olson (Eds.), *Perceived quality* (pp. 233-246). Lexington, MA: Lexington Books.

Sujan, H. (1991). Review. *Journal of Marketing, 55 (2)*, 82.

Swinbank, A. (1993). The economics of food safety. *Food Policy, 18 (2)*, 83-94.

Tenenhaus, M., Vinzi, E., Chatelin, Y.M., & Lauro, C. (2005). PLS path modelling. *Computational Statistics & Data Analysis, 48 (1)*, 159-205.

Tregear, A., Moxey, A. & Kuznesof, S. (1997). Marketing of regional foods: A policy perspective. AES Annual Conference, Edinburgh.

Yen, S.T. (1993). Working wives and food away from home: The Box-Cox double hurdle model. *American Journal of Agricultural Economics, 75*, 884-895.

Vanhonacker, F., Verbeke, W., van Poucke, E. & Tuyttens, F.A.M. (2007). Segmentation based on consumers' perceived importance and attitude toward farm animal welfare. *International Journal of Sociology of Food and Agriculture, 15 (3)*, 84-100.

van Trijp, H.C.M. & Steenkamp, J.B.E.M. (1998). Consumer-oriented new product development: principles and pratice. In W.M.F. Jongen & M.T.G. Meulenberg (Eds.), *Innovation of food production systems: Product quality and consumer acceptance* (pp. 37-66). Wageningen: Wageningen Pers.

Verbeke, W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics, 32*, 347-368.

Verbeke, W. (2000). Influences on the consumer decision-making process towards fresh meat: Insights from Belgium and implications. *British Food Journal, 7*, 522-538.

Verbeke, W. & Vackier I. (2004). Profile and effects of consumer involvement in fresh meat. *Meat Science, 67 (1)*, 159-168.

Verbeke, W. & Viaene, J. (1999a). Beliefs, attitude and behaviour towards fresh meat consumption in Belgium: Empirical evidence from a consumer survey. *Food Quality and Preference, 10 (6)*, 437-445.

Verbeke, W. & Viaene, J. (1999b). Consumer attitude to beef quality labelling and associations with beef quality labels. *Journal of International Food and Agribusiness Marketing, 10 (3)*, 45-65.

Verbeke, W. & Ward, R. (2001). A fresh meat almost ideal demand systenm incorporating negative TV, press and advertising impact. *Agricultural Economics, 23*, 359-374.

Verbeke, W. & Ward, R. (2006). Consumer interest in information cues denoting quality and origin: An application of ordered probit models to beef labels. *Food Quality and Preference, 17*, 453-467.

von Alvensleben, R. (1997). Consumer behaviour. In D.I. Padberg, C. Ritson & L.M. Albisu (Eds.), *Agro-food marketing* (pp. 209-224), CABI.

Waitley, D. (1986). The psychology of winning. Berkley.

Wierenga, B. (1982). Model and measurement methodology for the analysis of consumer choice of food products. *Journal of Food Quality*, *6*, 119-137.

Wilde, L.L. (1980). The economics of consumer information acquisition. *Journal of Business*, *53*, 143-158.

Wilson, N. & Fearne, A. (1999). A link between modernity and tradition - the case of several regional food products. Proceedings of the 67th EAAE seminar: *The socio-economics of origin labelled products in agro-food supply chains:spatial, institutional and coordination aspects.* Les Mans, France.

Wold, H. (1985). Partial least squares. In S. Kotz & N.L. Johnson (Eds.), *Encyclopaedia of statistical sciences* vol. 6 (pp. 581-591). Wiley-Interscience, New York.

Wood, J.D. & Enser, M. (1997). Factors influencing fatty acids in meat and the role of antioxidants in improving meat quality. *British Journal of Nutrition*, *78 (1)*, 49-60.

Wood, J.D., Nute, G.R., Fursey, G.A. & Cuthbertson, A. (1995). The effect of cooking conditions on the eating quality of pork. *Meat Science*, *40*, 127-135.

Wright, A.A. & Lynch, J.G.Jr (1995). Communication effects of advertising versus direct experience when both search and experience attributes are present. *Journal of Consumer Research*, *21*, 708-718.

Zeithaml, V.A. (1988). Consumer Perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, *52 (3)*, 2-22.